H.R. 3839

ESTABLISH A U.S. DESIGN COUNCIL WITHIN THE DEPARTMENT OF COMMERCE

HEARING

BEFORE THE

SUBCOMMITTEE ON SCIENCE, RESEARCH AND TECHNOLOGY

OF THE

COMMITTEE ON SCIENCE AND TECHNOLOGY U.S. HOUSE OF REPRESENTATIVES

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*On assignment to Budget Committee for 97th Congress.

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H.R. 3839—ESTABLISH A U.S. DESIGN COUNCIL WITHIN THE DEPARTMENT OF COMMERCE

THURSDAY, JANUARY 21, 1982

HOUSE OF REPRESENTATIVES,
COMMITTEE ON SCIENCE AND TECHNOLOGY,
SUBCOMMITTEE ON SCIENCE, RESEARCH AND TECHNOLOGY,
Los Angeles, Calif.

The subcommittee met, pursuant to call, at 9:17 a.m., in the Muses Room, Museum of Science and Industry, Exposition Park, 700 State Street, Hon. Douglas Walgren (chairman of the subcommittee) presiding.

Present: Representatives Walgren and Dymally.

Also present: Donald R. Rheem, minority technical consultant; Paul C. Maxwell, science consultant.

[Opening statement of Mr. Walgren follows:]

OPENING STATEMENT OF HON. DOUG WALGREN, LOS ANGELES FIELD HEARING ON H.R. 3839

Today, the Subcommittee on Science, Research and Technology will consider H.R. 3839, a bill whose primary purpose is to establish a Council on Design within the Department of Commerce. This hearing complements an earlier hearing held a little over a year ago on the same subject. Before turning the chair over to my friend and colleague, Congressman Mervyn Dymally, I would like to make a few brief remarks concerning our Subcommittee's interest in this legislation.

The Committee on Science and Technology and our Subcommittee have been for some time interested and concerned with the issues of technological innovation and productivity. I think it is fair to say that design is the keystone to any truly innovation process. Through design we are able to take the necessary steps to introduce new technologies and new concepts to provide new and imaginative products. I think design is also the important point where we examine the way to conserve energy as well as materials while at the same time strengthening our ability to compete internationally.

Congressman Dymally and Congressman Brown are to be congratulated for bringing attention to this important subject. I am looking forward to hearing from our witnesses this morning and the discussions to follow.

Mr. Dymally, I would now like to turn the chair over to you.

Mr. WALGREN. Let us come to order.

I would like to say at the outset, I am Doug Walgren and I represent a district from Pittsburgh, Pa., in the Congress. I am privileged to chair the subcommittee in which we convene here today and sit with my colleague from California, Mervyn Dymally.

I appreciate very much the opportunity to bring the subcommittee to Los Angeles and particularly to the educational and scientific communities that you represent here. This is a relatively informal but, nonetheless, very important exploratory effort. We are here to gather thoughts, attitudes and comments on where we are in our scientific community, how we are proceeding with innovation and

productivity, and particularly, in this instance, what kind of contribution we can make to our general well-being through efforts such as this particular design bill.

The Subcommittee on Science, Research, and Technology will consider this bill, H.R. 3839, whose primary purpose is to establish a Council on Design within the Department of Commerce. This hearing complements an earlier hearing held a little over a year ago on the same subject.

Before turning the chair over to Mr. Dymally, I would like to underscore the interest of the subcommittee in this subject. The Committee on Science and Technology and our subcommittee, in particular, have been interested and concerned in a broad range of issues related to technological innovation and productivity. I think it is fair to say that design is the keystone to any truly innovative process. Of course, it is not just limited to innovation that design is the key. In Pennsylvania, with the Three-Mile-Island incident that Merv might mention, we know design was at the basis of the accident and, as a result, a failure of design was the cause of a major turning point in American life. The safety design of the control-room panel was something that was unmanageable from a human perspective. When the accident happened, bells went off everywhere, and there was no way, because of the design of the instrument that we were using, that human beings could manage that accident. So design is fundamental to the well-being of our society.

Through design, we are able to take the necessary steps to introduce new technologies and new concepts to provide new products. It is also important to say that design is fundamental to our energy problems as well. Certainly, the design of the tools we use is the determining factor of the energy consumption that is related to them.

So what we discuss today is truly fundamental and something that I feel is of the utmost importance for the Congress to be aware of and to try to add constructive interest and involvement. So I want to say how much I appreciate, on behalf of my constituents, and, of course, you may never know how much I appreciate the contribution you make to the public discussion of this particular subject.

With that, I would like to express again my appreciation to Mr. Dymally for causing this discussion to happen. I want to, on a formal basis, turn the chair over to him, since he is more familiar with you than I, and I think our discussions will go better with him in the chair.

Merv, thank you.

[The opening statement of Mr. Dymally follows:]

STATEMENT OF CONGRESSMEN MERVYN DYMALLY, LOS ANGELES FIELD HEARING ON H.R. 3839

Thank you Mr. Walgren.

I am pleased to be here today to hear further about the questions of design. In particular, I hope to learn more conerning design in such high technology areas as the aerospace industry, communications, computer and information systems, energy, and materials. As I have noted before, good design is crucial to any high technology venture in guaranteeing that those products will serve our human needs humanely.

In a lesson to be learned from the Three Mile Island accident—a lesson to which our own nuclear energy designers here in California should pay attention—design

related to human capabilities was highlighted as the major source of the accident. To quote Dr. John Kemeny, the President of Dartmouth College and Chairman of the President's Investigative Commission on T.M.I.:

"We started our work with the prior conviction that the big problem was equipment. But, our overwhelming conclusion was that the basic equipment was amazingly good; it was the control room that *was terribly designed from the point of view of the people who had to use it.*" (My emphasis)

As Mr Walgren pointed out, design is the key to almost every aspect of innovation and productivity. This includes the aesthetic as well as the functional and technical beauty of a product or process. Design provides us with products that interrelate with our human needs harmoniously and safely. It provides us with useful and necessary products that can compete here and abroad. And, it is through design that we have the potential to improve our quality of life in this country and throughout the world.

Despite the importance of design, I have not seen any means by which our Federal government with its concern with the economy, and innovation and productivity is focusing on this issue. The bill that Mr. Brown and I introduced is an attempt to fill this need. The legislation follows from that introduced first by Mr. Brown, in the previous Congress, now modified to improve on that earlier draft. We do not create a huge new bureaucracy, but place our attention on a Council which would act as a focal point for the various design concerns outlined in this bill. The legislation is in the discussion stage at this point.

Today, I hope we can focus on the various aspects of this problem, particularly as they relate to innovation and safety in the high technologies. We have a distinguished group of witnesses here today, and I'm looking forward to their comments in helping my colleagues and me on the Subcommittee in further formulating our ideas on this issue.

Mr. DYMALLY. Thank you very much, Mr. Chairman. I note with some interest we have a State microphone. In my past experience with the State, they never work. [Laughter.]

First, let me welcome you to my old assembly and senate district. As a member of the legislature, I had the privilege of representing this district. I do not any more. In the Congress, it is now represented by Congressman Gus Hawkins, and under the famous Burton plan, I think it will end up in Congressman Dixon's district, so I do not know whether I am in Congressman Hawkins' district or Congressman Dixon's district.

But, nevertheless, this center here, this museum, has been the focal point for a lot of cultural, industrial, and scientific activity, and I am very pleased to come back here with some people whom I have worked with over the years and whom I shall have the privilege of introducing later.

I am pleased, of course, to have this opportunity, to work with Congressman Walgren. This morning I had to fill out one of those many forms that people send you asking your views about Congress, what you like about it least—the unnecessary House roll calls—what you like about it most—getting to work with this committee, and the subcommittee in particular, and Congressman Walgren, who has given me a tremendous opportunity to explore a new field in my legislative career.

In particular, I hope to learn more concerning design in such high technology areas as the aerospace industry, communications, computer and information systems and energy and materials. As I have noted before, good design is crucial to any high technology venture in guaranteeing that those products will serve our human needs humanely.

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Before I introduce our first two witnesses, Mr. Chairman, let me say that California pioneered in this area, and the witnesses who will begin on Panel No. 1 were part of that pioneering effort. Unfortunately, when the Governor eliminated the Department of Commerce in 1975, he also inadvertently eliminated the design commission in the State of California. Now that he is a strong advocate of high technology and productivity, I am posing this question to the witnesses with the hope that they will respond after they conclude their testimony. It would seem appropriate to now approach the Governor to recreate the California Council. Tomorrow he will be joining Congressman Walgren in addressing a conference on jobs and business opportunities for women and minorities in the aerospace industry, and I hope to tell him about this hearing here today and to urge that he reconsider reactivating the council. The fact of the matter is, it is still in the statute. All one needs to do is to refund it.

And so now, Mr. Chairman, I want to introduce to you and to the witnesses here Eddy Feldman, who was chairman of that commission, and Mrs. Carolyn Ahmanson, who was the vice chair. Will both of you please take the first panel. The witnesses may introduce themselves for the record.

STATEMENTS OF EDDY S. FELDMAN, FORMER CHAIRMAN, CALIFORNIA DESIGN COUNCIL; AND CAROLYN LEONETTI AHMANSON, FORMER VICE CHAIRPERSON, CALIFORNIA DESIGN COUNCIL

Mrs. AHMANSON. Good morning. I am Carolyn Leonetti Ahmanson.

Mr. FELDMAN. Good morning, gentlemen. My name is Eddy S. Feldman.

Mrs. Ahmanson, of course, is very modest. We, I feel, are honored by having her present with us as she takes this time off from her rather onerous duties as the newly appointed or elected Chairman of the Board of the Federal Reserve District. Was that the 10th district?

Mrs. AHMANSON. Twelfth.

Mr. FELDMAN. Twelfth.

Mrs. AHMANSON. The large West.

Mr. FELDMAN. The large West. She is the first woman in the history of the Federal Reserve System to be appointed to that very high office, and I just think that is a great, great thing, and we are flattered to be sitting here at the same platform with her.

Mr. WALGREN. I would like to say that we certainly salute that and want to wish you the very best in that role. From everything we in the Congress can tell, the Federal Reserve has a great deal to do with how our economy runs, and so few of us understand it. It is an area that I am reluctant to see the Congress really get into and splash around in, but I am pleased to know there are people like you that are in the important roles in that organization.

Mrs. AHMANSON. Thank you very much. As you know, this is the only Government agency that has this kind of public input. There are 260 directors throughout the United States, and we generally represent the public, consumers, and, of course, it is community service in a way, but we are very happy to assist however we can for the economy. After all, it is the lifeblood of our country.

Mr. WALGREN. We are honored you came.

Mrs. AHMANSON. Thank you.

Mr. DYMALLY. Mr. Chairman, I want to reassure you that Mrs. Ahmanson is for low interest rates. [Laughter.]

Mrs. AHMANSON. Yes, indeed. Housing is extremely important.

Mr. FELDMAN. Well, to get down to the business of the day, I want to express my appreciation for being invited to speak. I do not have my remarks yet typed and produced, but before the day is over, they will be submitted to the committee staff.

Mr. Walgren and Mr. Dymally have both expressed their interest in the role of design as a way of continuing the technological superiority of the United States. We also ought to think of design, and good design, as a means of improving the rather sad state of our balance of trade in this country, and in my own remarks, as I get into them a little more deeply, I am going to turn to the Japanese experience.

I had the pleasure and the honor of testifying on House Resolution 7270, which is the forerunner of the present legislation that we are talking about, which had been introduced in the last session of the Congress. At that time, I spoke generally of the California

experience. I should point out that Mrs. Ahmanson was the vice chairman during the existence of that commission here in the California Design Council, and I had the good fortune to be the chairman, so we have had occasion to work together before, and we are both supportive of this legislation.

But rather than repeating what I testified to there, generally speaking, in support of Federal legislation, in which we would join many other countries in the world doing the same thing, I thought I might focus a little bit on one country's experiences with design support by government, especially since that country is the one that we seem to be competing with most visibly in markets for a variety of products.

Mr. Dymally himself speaks with great knowledge of the California situation. At the time, I believe he was in the Senate when this legislation of the California Design Council was adopted, and later he became, by virtue of being Lieutenant Governor of this State, the Chairman of the Commission for Economic Development and had another opportunity to have firsthand experience and exposure to the operation of the California Design Council.

I should point out finally, in the way of introduction, that the legislation creating the California Design Council was signed by then-Governor Reagan, and both Mrs. Ahmanson and myself were appointed to the council by him. We would hope that this would suggest a favorable outlook by the administration when this legislation gets to it, but we will have to wait to see that.

Now, the Japanese do not make any secret about what they are doing in the field of good design, or design, as far as this subject is concerned. They do not print their materials only in Japanese. They print fantastic quantities of material in English. Whereas one reads the newspapers and sees a variety of private interests and some governmental spokesmen urging the Japanese to adopt some of our habits, like fewer work days, less pressure at the workplace, we have not focused on what the Japenese nation does in terms of capturing the marketplace or larger shares of the marketplace through the subject of design.

As I say, I would like to turn a little attention to the material which they readily make available to us if we will simply look.

After World War II and until about 1955, Japanese products had the reputation for being imitative, cheap and shoddy. As the production by the Japanese increased, their complaints increased, the complaints from users of their products throughout the world that the production that they turned out was indeed cheap and shoddy, but also, there was great annoyance on the part of producers around the world that the Japanese were copying what was being produced and cheapening and making shoddy those items, and in fact—and the Japanese are the first to admit the situation—there was a bit of an incident some years ago in Denmark over some toy monkeys that had been designed in Denmark and had captured the world's interest. The Japanese decided to copy it, and it annoyed the Danish people so much that the Japanese were barred from attending Danish trade fairs and were kept out of a variety of factories in Denmark.

Well, that kind of image did not sit too well with the Japanese, and they decided to do something about it. In February 1957 a

Design Promotion Council was established within MITI, which we have all come to know, the Ministry of International Trade and Industry, which is a part of the government of Japan. The object of the Council was the promotion and improvement of Japanese design.

In 1958, what is now the Export Inspection and Design Division was instituted in MITI's International Trade Administrative Bureau, under which, quote, the Design Promotion Administration hit its stride, end of quote. That is a Japanese spokesman saying those words.

One of the first undertakings of the Council was the selection of good design products, where the best designed items of Japanese manufacture were named and permitted to attach "G" mark labels, G standing for good. The first selections were made and exhibited at the Matsui Department Store in the Gensa in Tokyo. Cameras, sewing machines, and agricultural and chemical products were among the selections.

The system started with a view to inspiring the quality and design of the export products and making the domestic general consumers understand what good design is.

After 24 years of the "G" mark, the Japanese not only still support the program, but they are upgrading it, and that is pretty good when you think that that is a quarter of a century and many programs of any kind, or promotion, last 1 year or 2 and are dumped. But this one is still going strong, as we will see.

Selections of the items that get to use the label "G" mark are now going to be made in the name of the Minister of International Trade and Industry instead of the lower level bureau chief, so they have elevated the significance to Japanese trade of this "G" mark. At the same time, they are going to start awarding prizes in addition to the labels.

Finally, the Japanese are not all that provincial any more. They will now award the "G" mark to foreign manufacturers who sell in the Japanese market if the items selected do meet the standards which they have set.

So that is what has been happening, and indeed, I believe that people like Phillips and Braun—that would be from Holland and Germany—those companies who do sell in the Japanese market have received the "G" mark for some of their products, and they have also been awarded prizes. I cannot say that I know of any American companies which have invaded the Japanese market with the same success.

The standards for selecting the "G" mark products include appearance, function, quality and safety, among other concerns.

Now, at the 25th event, just to give you some idea—I had mentioned there were 24, it is really 25 years that this "G" mark program has kept up—650 items were selected out of a total of 2,791 products presented. Over the period of time from 1957, 6,867 products were submitted for approval of the "G" mark.

Promotion is by labels, special exhibitions permanently displayed at the Design Center in downtown Tokyo, publications by JIDPO, which is the Japan Industrial Design Promotion Organization, and by the sales efforts of the recipients of the "G" marks, those manufacturers who have been lucky enough to get those awards and get

that label. So they promote it in whatever advertising they do at wholesale and at retail.

So we have to conclude that this program is a rather successful one and has been continuing. It is a program, incidentally, that is what we in the California Design Council began to arrive at without even having any conception of what the Japanese were doing themselves, and I believe, Mrs. Ahmanson, I will remind you that before the Council went out of existence, you had begun to arrange for, I think, 10,000 to 20,000 feet here at this museum for a permanent display of the best of California design which would be here so that buyers from around the world or from this country come and see in a microcosm the best of what we do in California, and we make a wide variety of products here, everything from recreational vehicles to motion pictures, apparel, and furniture. Unfortunately, as was pointed out, the Council died before we could accomplish that.

I might divert a moment, Mr. Dymally. You said that perhaps the basic authorizing legislation was still on the books. I checked it out a few years ago, and I think they even repealed that, so I do not believe the Department of Commerce structure is there, nor all of the other agencies that were within it such as Tourism and Economic Development. I think they have all been repealed, so that it is going to take a new statute.

Now, in 1969, JIDPO, which I mentioned before, was established within MITI, and let me just indicate to you a range of the activities which they indulge in. It is important that we see just what this Council could do if it became law.

In the field of research and information, JIDPO—again, the Japan Industrial Design Promotion Organization—is engaged in research and information, collects data on domestic and overseas books, magazines on design and other materials. They maintain a design index, JIDPO does, reference materials on "G" marked products, newly developed products, market trends, and design offices.

Much research is carried on by JIDPO on new trends in design and the role of designers, not only in Japan but across the world. JIDPO carries on exhibitions, just as I described that we had intended to do. They have their permanent display in downtown Tokyo, and they carry on a variety of exhibitions throughout Japan and throughout the world. Many of these are arranged by what is called the Japan External Trade Organization, JETRO as we know it rather familiarly.

Publications: The Japanese, as I told you, make no secret about what is going on there. They publish a quarterly magazine called "Design Quarterly Japan," and we could do worse than insert some of these into the record.

There is another periodical I do not have here called "Design Age" which JIDPO publishes to notify the world of its own activities and current topics on design. Then for consumers especially, there is a quarterly called "Life and Design."

Now, not unlike something we did some years ago and in many kinds of legislation like this that the Congress adopts, when the Congress adopted the National Endowment on the Arts and Humanities, it said to the States of the United States—and again, I

might divert here for a second. California was the second state in the United States, before the National Endowment on the Arts Act was established, to establish a commission on the arts, the California Arts Commission, I believe, and, Mrs. Ahmanson, you were either vice chairman or chairman at one time.

The Congress induced all 50 states to set up arts councils in this country by saying to them, If you do, we will provide $50,000 as a budget, and you can raise the rest of the money from your own State or however you see fit.

This legislation, I think, provides a framework for encouraging States to adopt and create their own design councils. In Canada this is done. There is a Canada Design Council, and each of the provinces of Canada has a design council. These councils meet on their own and promote and encourage the unique qualities that may be found in those provinces, and then they meet with the Federal Design Council and, by cross-fertilization, help each other.

Well, the same thing has been done in Japan. The country has been divided into regions, and there are subcouncils, as it were, promoting the design of those regions.

There are, as we have already mentioned, selections of good design. Most pleasantly and perhaps surprisingly, unless one follows the activities going on in Japan closely, Japanese have taken a large interest in international impacts of design. They are much concerned about the Third World. They have created and held symposia in Japan on the significance of design in the Third World. They bring students, design talent, from those countries to Japan and let them be exposed to matters of design, design training, and design education.

The Japanese have indeed published a manual here called "Group Training Course in Industrial Design, 1980," published by the Japan International Cooperation Agency and in connection with JIDPO. The stated purpose of this course aims to "increase the participant's understanding of the true nature of industrial design through lectures, case study, practical training, plant tours. Further, its purpose is to promote design and design development in the various nations by introducing systematic design development methods such as merchandising, design development, and presentation methods."

So then we see that the Japanese not only try to evaluate the importance of design, and good design, to their own sharing of the world markets, but they do seem to feel that they have an obligation to other parts of the world because they feel that design is an international phenomenon, not something which is totally provincial.

They have come now, as they look at the eighties and announce their new objectives for this decade, they point out that they feel that design promotion activities will be more complex in the 1980's because of the drastic changes that they, the Japanese, are forced to face.

At the present, they say, they are promoting design activities to cope with such situations as internationalized markets, diversified markets, information-inclined markets, energy conservation.

Well, I should lastly point out that the Japanese are very supportive of what is called ICSID, the International Council of Soci-

eties of Industrial Design, an international organization of councils that promote design, governmental and some private, throughout the world. The Japanese held such a conference, annual meeting, in Tokyo some years ago. It was very successful. They support all the activities of this international organization.

I would repeat that the reason for taking the committee's time in reviewing the experience, in a superficial manner, admittedly, and from their own literature, admittedly, is that we find ourselves, or at least we do it in the press, spending most of our time, as we fight this adverse balance of trade, confronting the Japanese nation. They are friends, and we perhaps should take a more intense study of how they find it is important to capture the largest share of the market, rather than some of the artificial means which we have been using up to the present time.

I thank you.

Mr. DYMALLY. Thank you very much.

Mrs. Ahmanson?

Mrs. AHMANSON. Thank you very much.

Chairman Walgren and gentlemen, it certainly is my great pleasure to have this opportunity to testify in behalf of H.R. 3839, a bill that would establish a U.S. Design Council within the Department of Commerce, and I am especially grateful to Congressmen Dymally and Brown for introducing the bill.

I have long been aware of the importance of design in the sale of merchandise, whether it be the merchandise or the packaging of the merchandise, from a standpoint of economic development. I have also been very aware of the importance and the impact, the economic impact, of the cultural resources, for instance, within a community. I had the pleasure of having such a survey made for the Los Angeles Area Chamber of Commerce, and it was astounding to see how moneys flow through these various areas and how many people are employed.

Now, there is no question that the products of the United States, ranging from prime wines, food, fashions, films, automobiles, airplanes, aerospace products, boats, other manufacture technologies, artifacts, accessories, and other products, demonstrate that the United States is a way of life—we do have a certain style—and they all show the creativity and the ingenuity and diversity and high quality of U.S. products.

We hope that the Council would implement programs to encourage continual upgrading of U.S. product design and marketing and help promote the sale of those products. Programs for the Council should be aimed at promoting the fact that the United States produces many of the best-designed, highest-quality products in the world.

As demand for the U.S. products increases and sales grow, U.S. business and industry will certainly expand. The result will be, more importantly, not only more sales but more jobs for Americans. We want to see that all of the U.S. producers, manufacturers, growers, and processors and those that provide the services maximize their sales because of the benefit to the United States and the Nation's economy and trade balance.

I do believe, especially, that this valuable assistance of such a Council will help tremendously, especially to small businesses, and that other countries—we were certainly given this wonderful example this morning by Mr. Feldman—have such programs, and they have increased their Nation's business and exports. The United States must not be anything but No. 1 in product design and merchandising, and therefore I strongly urge the establishment of a U.S. Design Council.

I believe that we have the opportunity today, particularly. Our country and our business was established on productivity, and I am afraid that has slipped. I think that there are many ways that we can help to encourage productivity, and certainly I think that pride of product is one. I do not think there is any question that pride of product has to do with the ability of that product to be attractive on the sales point, and that has to do with design. I believe it has to do with safety of a product. That has to do with design, as the chairman certainly expressed at the opening relative to scientific products.

I do believe that, from a standpoint of sale, it is absolutely essential. We want to encourage, wherever we can, to build more plants, to hire more people, so anything that we can do to help to encourage sales, we should do.

I believe the Department of Commerce could increase its effectiveness in the United States by assisting, as I mentioned before, especially small businesses who perhaps cannot afford large design departments to be able to help them to know where to go, how to get this kind of service from either private entrepreneurs or companies.

There are many ways to do that, as has been mentioned; certainly by publications, by seminars, by visiting in the fields.

In the interest of time, I am going to close my testimony, but I do want to again urge the passage of this particular bill because I believe in its importance and its help to the economy of our country.

I hope that you will forgive me. I do have to leave for another meeting, but I appreciate very much this opportunity, and I thank you for having asked me to testify.

Mr. DYMALLY. Thank you very much, Mrs. Ahmanson.

Mr. FELDMAN. May I make just two observations before I leave the platform.

Mrs. Ahmanson, you might want to know what the Japanese spent for all of this. Apparently, for the year 1981, they spent $1,800,000, not all that much for the gigantic effort which we see.

The last incident I would like to mention, we were talking about how Japanese products are exhibited, at permanent exhibitions or in other ways, in museums such as this. But we observed, some years ago, that the Japanese had a ship called the *Japan Trade Fair.* As I remember it, having been on this vessel, it had about 35,000 feet of exhibition space in which could be shown, and indeed were shown, presumably, the best of Japanese products, whether it was television sets or bicycles or machinery or machine tools or pianos, for that matter.

This vessel would go around the world stopping at various seaports, and American or Korean or French or English businessmen

were invited to come aboard the vessel to see the various products that the Japanese were making. They did not make you come to Japan to see them; they brought it, really, down to your own harbor.

Now, that is fine, and apparently it was very successful, although the Japanese do not do that any more. But it seems to me, and I cannot document this at the moment, and I would like to before these hearings, not today conclude but eventually conclude, that that vessel was sold to another country to be used for the same purpose, apparently, and unless I am mistaken, it was the United States that bought that ship, and we have it today. Now, I do not know what we are doing with it, but I am pretty sure we own it.

Thank you.

Mrs. AHMANSON. I would like to add one other point, talking about the cost. I believe that there would be a way of having the private sector participate, just as the National Endowment for the Arts and the Humanities has matching programs. I do believe that there would be ways of setting up some kind of a foundation whereby the private sector, particularly the larger companies, could in some way participate in encouraging this kind of a department.

So I understand, in this particular time in our history where we are so aware of costs and need to cut budget, that there would be a way, with the President's dictum, of having greater participation from the private sector, and I do believe that there would be a vehicle in this Design Council whereby this could happen.

Mr. DYMALLY. You have just made a most significant amendment to the bill. [Laughter.]

Mr. FELDMAN. Well, she has, and there is such an organization. It has been incorporated in California. It is called the U.S. Design Foundation, and it is in the process of getting its tax exemption. It already has received it from California, and it is waiting for Federal action.

Mr. DYMALLY. Thank you very much, Mrs. Ahmanson.

Mrs. AHMANSON. Thank you.

Mr. DYMALLY. Mr. Feldman, just one question.

Mr. FELDMAN. Sure.

Mr. DYMALLY. Mr. Chairman?

Mr. WALGREN. Perhaps we can sort of explore with you, Mr. Feldman—I was just curious about other things that the Japanese might be doing that we can learn from. Coming from Pittsburgh, I am struck by our failure in the competition with Japan. We produce a great deal of steel for automobiles, and when the automobile industry is down, unemployment is rampant in my area.

I am interested when you say that one of the things they do is really sort of promote the export. I guess I am concerned that we might be moving into a phase of industrial culture where our abilities to produce are so great that one country may do all the producing and another country may do all the consuming. We sort of pass around the unemployment like squeezing the air in a balloon, and if we don't measure up in that competition or do not control the imports, we might find ourselves having all the unemployment.

What other kinds of things do the Japanese do through this design effort, other than, as I understand it, set certain standards that they then approve for export. They are so focused on export,

and we know why, and they have a leverage on their economy because of it that can really mobilize that economy.

Then the rest of your examples were largely sales promotion so that the effort to secure the sale will then pull up the design or pull the design improvement behind it.

Are there other things that you can point to that the Japanese have done? You mentioned the amount of money that they spend. Do you know what that money goes for, and how much was it again?

Mr. FELDMAN. It was only $1,800,000. They say they have 17 people on the staff of JIDPO. The rest of the money, then, I would assume is spent in either prizes or promotional materials of one kind or another, or travel expense, and so on.

I do not know of any other activities—I am not saying they do not have them—other than what I stated to you, which I read to you from their literature, as to how they go about improving the quality of design or marketing it, any further than what we see there.

Mr. WALGREN. But the common purpose they have in a differently organized society is serving them very well.

Mr. FELDMAN. Yes. What you say is true. I do not know that we—this legislation that is proposed here does not try to set quality standards itself. I think the old version did, and there may be something in here about that. It is a very tough thing, in a free economy like our own, to demand that kind of action of a compulsory nature.

Our most common experience with Japanese good design is when we buy a camera or some optics of some kind, to see a little gold label on it which says "Passed MITI," a little circular, not circular but a little oblong gold tag. We would never in this country, I believe, go that far on a compulsory nature. Now, volunteer, yes, that might be a very good thing.

Years ago, the Museum of Modern Art in New York had a good design award. It was a private institution totally. It happened to have on its staff a remarkable gentleman with exquisite taste, and for several years they offered these good design labels to the merchandise which was submitted for the museum's approval, and I believe that many, many people of sophistication looked on the store shelves for that merchandise.

When that gentleman passed on, the promotion of the whole idea fell, and then it was picked up by the British Design Council, who have been at this 15 years. They have a good design label, and that has helped their merchandising of their goods throughout the world.

Mr. WALGREN. Do I understand that California's effort in this area sort of died before it got a chance to have any governmental expression?

Mr. FELDMAN. No, no. We had this California Design Council. It was a government agency.

Mr. WALGREN. And did it function——

Mr. FELDMAN. It functioned for something more than 3 years, and at that time we developed a California logotype. We were working towards a California label. We would have liked to see

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every carload of lettuce going out of California with a big California label going on it, attached.

We succeeded in showing California products at halftime during some nationally televised football games in the coliseum.

We were working on a catalog of California crops. There are about 1,000 stores in the United States who can do a storewide promotion of anything, whether it is French products or British products or American products. We were preparing a catalog of posters—orange trees, all the things that characterize California—which we were going to send—that was our intention—to each of these 1,000 stores, to the promotion managers, public relations people, so that we could try to persuade them to do a storewide California promotion, like Marshall Field or Stichsbear Fuller or the great stores in Pittsburgh, and then, through this council, they would have this book, and it would tell them, "We want to have a storewide promotion, we want to decorate the store, we want to have people out there from the motion picture community to hype things up, we want posters, we want to see who will give us a free ride back there." That was a thing that went down the tubes with the end of the council.

One of my great personal reactions of a tragic nature was that we never did get to put, right in this building, a permanent exhibition of California furniture, California apparel, California yachts, California recreational vehicles, roller skates. You name it; it is made here. It is a great State, you know, and we have often said it would be the seventh or eighth largest country in the world if it were a nation by itself.

But it had pretty good support, I would say, from the business community and certainly from the design community and the merchandising community.

Mr. WALGREN. The council had how many members?

Mr. FELDMAN. Fifteen.

Mr. WALGREN. Fifteen. You mentioned the promotion aspect of it, the trade promotion, which is apparently also heavily emphasized by the Japanese. When a council like that gets together, it talks about design. Do they have any other directions in which they would like to see a group effort other than in promotion of sales of existing projects. What do they talk about when they get together?

Mr. FELDMAN. Well, one illustration might be municipal design, design of street furniture. I believe we held a conference, for example. We sit there and we look around, and we say these things could be improved, park benches, street lighting, fireplugs, these could all be improved. Our fine design school spent a lot of attention, a lot of student projects on these kinds of things.

So we got together and we held, with the League of California cities, a conference in Palm Springs in which the California Design Council had a part in urging city planners, city councilmen, others to be more contemplative or concerned, more aware of the impact of better-designed products on their municipal functions.

So that was one way we were thinking. It was several years ago, so I do not necessarily call to mind quickly as you asked the question the kinds of things that were discussed.

Mr. WALGREN. Was there a good university-related thrust to it?

Mr. FELDMAN. Yes. One member of the council was Jack Christ, who was in charge of the industrial design program at San Jose State College, the State University of San Jose, and he, as an academician, as a practical industrial designer, brought good contact with design efforts at UCLA and with Art Center. I guess Otis had not yet joined with Parsons, so we did not have the benefit of an association of that kind.

Mr. WALGREN. Was there any big business versus small business difference in interest in this kind of joint activity?

Mr. FELDMAN. No, there was not, but I do not know that we had lived long enough to make an impact where, let us say, some large business people might resent what was being offered by the State of California to small business.

Mr. FELDMAN. Well, you know, they say that the magic of the United States is in its federalism, and I think the real magic is that there are the 49 States and then there is California. The real magic is that we have a State that is as large and as diverse in its economy as California which can generate a critical mass and would naturally start to tend to do the things that need doing by people together, and the Federal Government certainly should not be far behind. So I hope we can encourage it.

Thank you, Mr. Dymally.

Mr. FELDMAN. Let me make just one last comment and then I will leave, finally.

We did have, since you have asked, a good relationship with the California chapters of the Industrial Design Society of America, both the northern and southern California chapters.

Thank you.

Mr. WALGREN. Thank you very much.

Mr. DYMALLY. May we have the second panel: Professor Allen Rosenstein, Mr. Brian Wynne, and Mr. Howard Hirsch.

While they are coming, is there anyone here from the Department of Commerce?

[No response.]

Thank you.

Would the witnesses identify themselves again for the record, starting with Dr. Rosenstein.

Dr. ROSENSTEIN. I am Allen Rosenstein, Professor of Engineering at UCLA.

Mr. WYNNE. I am Brian Wynne. I am executive director of the Industrial Designers Society of America.

Mr. HIRSCH. I am Howard Hirsch. I am the president of Hirsch-Bednor Associates, a design firm here in California.

Mr. DYMALLY. Professor?

STATEMENTS OF ALLEN ROSENSTEIN, PROFESSOR OF ENGINEERING, UCLA; BRIAN J. WYNNE, EXECUTIVE DIRECTOR, INDUSTRIAL DESIGNERS SOCIETY OF AMERICA; AND HOWARD HIRSCH, PRESIDENT, HIRSCH-BEDNOR ASSOCIATES

Dr. ROSENSTEIN. Chairman Walgren, Mr. Dymally, thank you for inviting me to comment on House Resolution 3839. As you will see from the biography attached to my written testimony, I have had a

long-standing interest in the theory and practice of design and a dedication to the improvement of U.S. design education.

In the late fiftie's and sixtie's aided by a large Ford Foundation grant, I had the privilege of being the principal investigator of an extensive study that turned out to be quite pertinent to our topic here today. The UCLA School of Engineering at that time undertook an examination of engineering education that expanded into a 13-year comprehensive study of the professions and their role in society.

This work led to a number of conclusions that challenged the conventional wisdom of the sixtie's. We predicted over 14 years ago, when the United States, if you will recall, was in a golden industrial era, that we were headed for massive trade deficits, a reduction in productivity improvement, and a very much lower relative national quality of life.

As one instrument needed to turn aside the course that we felt the Nation was taking, we recommended the creation of a national problem-oriented foundation that would be the professions' counterpart of the National Foundation on the Arts and Humanities and the National Science Foundation.

Let me begin my testimony this morning by indicating my complete support and enthusiasm for the concepts embodied in H. R. 3839 and, in particular, for the direction it would provide for the country. I think this is particularly important. I would like to focus my testimony on what I consider the most important and insightful part of the proposal, Section 6, which describes the National Design Program. Here in Section 6 is clear recognition of the impact of our national design capability upon our society, its economy, our international trade position and, ultimately and most important, the very quality of national life.

House Resolution 3839 suggests the need for design policy and standards at a time when thoughtful citizens are recognizing the inadequacies of our present institutions. I do not believe today one has to be very astute to realize that this nation is in trouble. You have only to read the business section of the Los Angles Times and its gloom, doom, and large companies foregoing their dividends—Ford is in trouble, Chrysler is in trouble, U.S. Steel is in trouble; we have lost our consumer electronics industry; savings and loans are going bankrupt; and I could go on and on.

In the past 10 years, the United States has slipped from first to about tenth place in the world for GNP per capita. Last year Japan produced 3 million more automobiles than the U.S. automobile industry, and we all know that that has long been the bastion of our economy.

We shall briefly examine the issues and provide a little further background, and then I would like to consider design in its broadest sense and give my definition of design. We consider it a responsible decisionmaking process that is used to increase the value of the nation's precious resources and improve all of our societal environments.

However, although House Resolution 3839 concerns itself with design quality and marketing, and these are very important, these are still suboptimization problems that can be addressed consistent-

ly only in terms of the larger problem of maintaining and improving our national life quality.

Our national life quality, in turn, is a composite of the collective environments which are created as a result of the resource allocation and environmental decisionmaking responsibility of what we call the public professions. We will see very shortly that leadership in design and technical innovation, while very, very important, does not guarantee a place in the market if the proper political, industrial, financial, management, et cetera, environments do not all exist. Unfortunately, none of our professions acting alone can solve the problems we face today because, unfortunately, these environments are so interrelated that they cannot be effectively treated individually.

Our predictions of some 14 years ago of declining relative life quality and productivity improvement were based upon five observations that we made at that time.

First, we observed the abandonment of the U.S. land grant tradition of higher education, which emphasized design, the professional schools, and, most important, cooperation among industry, government, universities, and the professions. It has slowly and insidiously been largely replaced—and most people do not recognize this—with the British arts-science two-cultures tradition which deemphasizes the professions and practical matters to concentrate upon scientific excellence.

Unfortunately, this trickle-down theory that says that industrial competence automatically follows scientific leadership simply is not true. England, espousing the trickle-down theory, has become an industrial basket case and, unfortunately, we are following close on its heels.

Two, as a professor in a major university which calls itself, unfortunately, a research university, I found the second observation was particularly hard to accept, for it can be demonstrated that there is absolutely no connection whatsoever between a nation's basic research capability and its ability to compete in the world marketplace. This is quite contrary to much of the conventional wisdom that guides the conduct of our large universities.

While the English-speaking countries, including the United States, after World War II directed their national efforts towards basic research instead of applied R. & D., the rest of the world took an entirely different approach. Peter Drucker pointed out that totally different countries such as Russia and Japan deliberately kept their scientific investment low, and I quote Drucker. He said, "It is not true that a modern country needs a science base. It can purchase it or it can import it."

Basic research is an international free good. It is available simply for the price of the journals. In other words, you can buy billions of dollars of research effort simply by subscribing to the journals. Our competitors are directing their resources, including their best young minds, into the professions and design to improve their design capability and their national quality of life.

As a third observation, we found that the United States was adopting the adversarial posture that has failed and which continues to fail in Britain, with government, industry, labor, education,

and the professions each trying to increase its individual return instead of the total good.

As a fourth observation, we observed then and, unfortunately, it holds true today that it has taken the United States over two decades to reach its present state, and it is not going to be easy to turn it around. But as far back as 1966, only a handful of U.S. industries such as agriculture, electronics, computers, aircraft, and chemicals were actually thriving.

Our success in these areas masked the fact, again back in 1966, that some 122 industries, ranging from automobiles, steel, ships, textiles, which had formerly dominated world markets and employed at that time 35 percent of the industrial work force, were running a $7.5-billion trade deficit.

We observed that prospering industries, by and large, retained a cooperative partnership of government, industry, university, and professions. Declining industries, practically without exception, did not.

Fifth and finally, most important, we observed that the Nation's institutions were not being changed to match the intrinsic structure of the problems of a modern society. We had a science foundation for science and an arts and humanities foundation for the arts and humanities. We did not have a national foundation dedicated to national problem solving and design. As I think others will testify, this lies at the heart of the Nation's quality of life, because all of the Nation's problems had become professions problems, and all required a multiprofessional resolution.

We did not find a single problem, including international trade or productivity, that could be resolved by a single profession acting alone.

Today, as predicted 14 years ago, the United States and Britain lead the world in two very distinct areas: Nobel science awards and trade deficits. Japan and Germany, on the other hand, contribute very little to basic science, and all they do is lead in international trade. I might point out that Germany has reduced its capture of Nobel science awards to about one-third of their prewar level.

It is very important to realize, however, that we are having troubles in every professional area, not just in trade alone. In education, U.S. achievement scores are edging down with 20-percent illiteracy, whereas Japan has less than 1 percent illiteracy. Crime in the United States is increasing; in Japan, it is decreasing. In the field of pollution control, Japan started later but it is now doing more than the United States. As you know, Japanese cars have lower emissions than U.S. cars.

In the area of health, it is interesting that in 1950, when the science foundation was established, the United States was sixth in infant mortality. By 1967, our science program had paid off. The United States was winning 50 percent of the Nobel prizes in medicine and, incidentally, we had dropped to 18th place in infant mortality and 21st place for longevity.

Today, the Japanese make very little contribution to basic medical science. The only thing that their doctors can say for themselves in their defense is that the Japanese have become the world's healthiest people. They have the lowest infant mortality rate and, 5 years ago, they passed the Swedes in longevity.

It is important to realize that our trade, innovation, productivity problems are symptoms of a much larger and critical problem, and that is the manner in which the country has organized its institutions to conduct its affairs. Our Nation is entering the 21st century with institutions which were largely designed for an 18th century agrarian country.

John Kemeny, who is the Chairman of the Three Mile Island Presidential Commission and has been quoted by the chairman, has written a brilliant paper that should be read by anyone who is concerned with this country's future. Kemeny said:

> I've heard many times that although democracy is an imperfect system, we somehow always muddle through. I am very much afraid that it is no longer possible to muddle through. The issues we deal with do not lend themselves to that kind of treatment.

What is principally lacking on the Federal scene is the existence of respected, nonpartisan, interdisciplinary teams that could at least tell us what is possible and something about the pluses and minuses of different solutions.

My last point and the most important one is for our nation to recognize that the present system does not work. It was designed for a much earlier and simpler age.

"The only way to save American democracy is to change the fundamental decision process at the Fderal level so that it can come to grips with the enormous and complex issues that face our Nation."

Well, how did we reach our present state? We should contrast problem resolution in a healthy U.S. industry such as agriculture with the United States auto industry, which we all know is quite sick, and then compare that with an emerging Japanese industry for contrast. U.S. agriculture is probably our most efficient industry. It provides $17 billion each year of trade surplus, and yet, if you look at agriculture closely, it is fragmented, highly diversified and dispersed, with thousands of products and millions of individual farmers. It is nearly impossible for even the largest farmer to make a significant R. & D. contribution.

Still, as a result of a long-term partnership of government, industry, education, and professions, U. S. agriculture is a highly technical, efficient industry. The reasons are quite apparent when you look at it. Government, with industry and university cooperation, subsidizes long-term applied R. & D. As an example, much of California's farm industry's farm machinery was invented at the University of California at Davis. Davis also created one of California's most happy industries, our wine industry.

The university not only solves the farm industry's problems but, also, it educates practitioners to implement the solutions, and this is extremely important. A solution without trained minds to implement it is useless.

Our handling of auto industry problems such as exhaust emissions stands really in sharp contrast to our agricultural system. Typically, a young bureaucrat, perhaps one of our graduates, without knowledge of the full physiological effects of emissions or of the potential cost/benefit tradeoffs of, say, an extra one-tenth of 1 percent reduction of emissions, will set standards without knowing if they are practical or even useful. Each of four automobile manufac-

turers will then independently consume their limited development resources to, first, investigate the basic phenomena; second, educate engineers in the problem; and, third, develop generic methodology to satisfy the requirement if, indeed, it can be satisfied, and each often will spend hundreds of millions of dollars to find that just a small change in the standards would enable them to be satisfied. It is hard to imagine a more inefficient, duplicative process than the one we have.

Japan, on the other hand, is a good example of our competition, for they have recognized the need for national policy and cooperative long-term programs to further the national interest. After World War II Japan set out, deliberately and methodically, to create the institutions necessary for an effective modern society. It took the best from the United States and other nations and it improved upon them. Their leaders realized the advantages to be gained from the industrial application of the United States agricultural system.

I would like to consider the Japanese computer industry as a model because computers are one of the mainstays of California industry, and that industry is under a great deal of pressure today. I predicted 10 years ago that the United States was going to lose its leadership in computers, and we are well on the way to doing that.

Twelve years ago, MITI, which is the Japanese Ministry of International Trade and Industry, allocated $250 million to support six industry-university teams in three major projects over a period of 5 years. I want to point out that here you have the case of the government taking the leadership with both industry and the university on what they considered a national industrial undertaking. The approach was highly successful in that it reduced IBM's share of the Japanese computer market, it laid the foundation of the computer industry; and they trained large numbers of very competent computer engineers.

Six years ago, Japan took the next step to complete the job by putting up $1.2 billion, again in a cooperative 4-year program, to develop the basic technology for all of their industry for very large-scale integrated circuits, called VLSI. The Japanese know that large-scale integrated circuits are the heart of the modern computer. The country that controls VLSI production will dominate the computer and information processing market. With their project completed, Japan has already captured over 50 percent of the 64K chip market and is now expected to dominate the latest advance into 256K chip production.

The U.S. response to this Japanese initiative was extremely interesting. Our Justice Department moved to break up IBM, the only computer company large enough to finance a comparable development. Two years ago, after the Japanese program was completed, our Defense Department finally advanced $300 million in a catchup program; it was 4½ years late. It also seems strange to use the defense budget for civilian development.

I want to note the magnitude of the money involved in this one area alone: $1.2 billion is ten times the National Science Foundation's total annual applied science and engineering budget. Funding in the limited amounts that Congress has approved would indi-

cate that the United States does not understand the nature and magnitude of international competition.

The Congress should recognize that international trade competition is no longer between individual companies. The competition is between countries. The question we have to ask is how many U.S. corporations can put up $1.2 billion to stay in the game.

Now, if our industrial structure seems inadequate and obsolete, our industrial capital formation process is actually medieval. Japan has created a financial structure that provides a Japanese company with five to nine times as much working capital as a comparable U.S. corporation with the same equity. In other words, the Japanese national financial structure and policy, by itself, gives its manufacturers an almost insurmountable competitive advantage.

This leads to the need for national policies. The development of a national economic and fiscal policy which in turn created a new financial system to complement the national industrial policy illustrates how well the Japanese have recognized the importance of integrative national policies.

Let us look a bit further at Japanese policy and planning. With the country well on its way to control the basic components of the computer, Japan is now turning its attention to very large-scale computers and computer software. MITI has been supporting four companies to develop super computer technology which will provide computer speeds that are 100 times faster than anything planned in the United States today. By 1988, Japan expects to lead the world in super computer production.

A high standard of living generally means high labor rates. If you want to have a high national quality of life, there have to be suitable salaries paid so people can afford it. In anticipation of increasing living standards, Japan presently employs in manufacturing over 50 percent of the free world's robots. They are now using robots to manufacture more robots, and they are the world's leading exporter of robots.

The "unmanned factory" concept and its implementation, is a national project in Japan that was begun by MITI in 1977. By 1984, Japan expects an unmanned factory with only 10 technicians will produce the same amount of product as a conventional U.S. factory with 700 employees. In other words, they expect to have a 70 to 1 productivity advantage in the unmanned factory.

Turn to educational policy, and it is an integral part of the national industrial strategy. Twenty percent of Japanese undergraduates are studying engineering, while 40 percent of their masters are in engineering. By contrast, engineering provides only 5 percent of the U.S. undergraduate degrees. As a consequence, Japan, with half of the U.S. population, produces twice as many engineers as the United States.

The discrepancy between U.S. needs and actions is highlighted in California. We graduated 1,788 electrical engineers and 1,581 lawyers in 1970. By 1980, the need for engineers was becoming critical, and our universities, I am proud to say, responded. They increased the production of lawyers by 300 percent to 5,430. They reduced the production of engineers by 30 percent to 1,277. Southern California is said to have more lawyers than all of Japan.

There is in the United States an unfortunate tendency to overlook Japan's stunning ability to develop and implement successful national policies by attributing their accomplishments to Japanese character and tradition. If we only had their character and their tradition, we would not have any problems. Well, in most cases we are deluding ourselves, for much of what we accept today as Japanese tradition is of very recent origin. This is illustrated perhaps most forcefully by Japanese financial policy.

Japanese industry borrows money at an average rate of 9.3 percent, while the U.S. cost of capital averages 17.5 percent. With lower capital costs and ready availability of funds for expansion, Japanese industry is ideally situated to sell at lower prices and capitalize on emerging markets. We might complete this picture by noting that the Japanese Government, for example, gives its chip manufacturers special tax privileges, low interest rates, a direct subsidy of $400 million each year, and a 10-percent tariff against imported chips.

The availability of capital funds must ultimately relate to the manner in which a nation's citizens employ their disposable income; in other words, the national policy toward savings. Contrary to what you might believe today, Japan was once a nation whose leaders complained, "When a worker gets his pay in the morning, he spends it in the evening."

In 1930, the Japanese saved only 5.8 percent of their disposable income, and it is very close to our present U.S. rate of 5.6 percent. By 1973, however, the Japanese became the world's champion savers, putting 20 percent of their disposable income into savings.

The reasons for this drastic change in national character—in other words, we now characterize the Japanese as people who know that they want to save money, and this occurred in approximately 40 years—were very simple. A new fiscal policy was needed to finance Japan's industrial expansion. Consequently, their tax laws were modified to encourage savings by allowing a salaried worker in Japan to receive tax-free interest on savings accounts up to $63,043. In the United States, the very new all-savers certificates allow an American to avoid taxes on about $7,900 worth of savings. In other words, there is an 8 to 1 difference in our policies toward savings.

Well, where do we go from here? It should be obvious that the present system is not working for the United States. There are serious structural omissions and inconsistencies that have become too costly to leave uncorrected. Scientific leadership does not translate into economic strength. Innovation by itself is not the hingepin of international trade, and engineering acting alone cannot turn the tide.

There are a number of examples of this. I will just give you one. Professor Tribus observes the United States and Britain did 90 percent of the basic research and innovation on liquid crystal displays, while the only thing that Japan can say for itself is that it manufactures 90 percent of the product.

The growing inability of the Nation's institutions to cope with our mounting problems insures that the time has come for new institutions to emerge, and indeed, H.R. 3839 is among a growing list

of proposals designed to cope with all or part of the national need for institutional change.

Of particular interest is the widespread recognition in many areas of the need to create new national policies. Charlie Sporek, who is the president of National Semiconductor, one of our fastest growing and most innovative semiconductor manufacturers, said: "We must have an industrial policy. Someone must decide—don't ask me who—whether we want an information processing industry or not." He was referring to the fact that their industry is under such competition that if there isn't a policy, we will lose it.

The U.S. Activity Board of the Institute of Electrical and Electronic Engineers, IEEE, with over 1 million members, recommended that we adopt a national technology policy.

Representative Bolling, in a recent book, spoke to the creation of a balanced economic policy.

In addition to H.R. 3839, other bills have been introduced to address the various parts of the policy issue. H.R. 3749, the National Technology Foundation, is a well thought out proposal to advance the Nation's technology and engineering.

H.R. 3817, the National Professions Foundation bill, which was first introduced in 1973, recognizes the essential multiprofessional nature of the Nation's problems and proposes a professions foundation to be the Nation's professions policy counterpart of the Science Foundation and the Arts and Humanities Foundation.

Well, we should look to the possible solution. Industry requires a constructive tax structure, a partnership with government, education, professions, and labor instead of our present adversarial posture. Industry requires a means for acquiring adequate financing at a reasonable cost and an enlightened patent policy.

The society requires improvement of all environments for which the professions bear responsibility; that is, the quality of life. We require protection from both pollution and resource shortage. As a Nation we need a means to formulate, evaluate, and institute national policy alternatives. A means is needed to change our institutions to meet new requirements.

To conclude, we should recognize that all significant national issues hinge upon questions of resource allocation, environmental decisionmaking, and design. Every major issue, now and in the future, requires a multi- and interprofessions resolution that is not readily available within the individual scopes of the three bills, H.R. 3749, 3817, and 3839.

However, the basic concepts embodied in these bills are excellent, and they are not conflicting with each other; they are actually mutually supporting. Therefore, we would like to propose the consideration of a National Professions, Design, and Technology Foundation to include the resource allocation and environmental decisionmaking responsibility of the public and design professions in the interest of national life quality.

Thank you very much.

[Professor Rosenstein's full prepared statement follows:]

Testimony of Dr. Allen B. Rosenstein
Professor of Engineering
University of California at Los Angeles

January 21, 1982

Mr. Chairman: Thank you for inviting me to comment on H.R. 3839. As you will see from the biography attached to my written testimony, I have had a long standing interest in the theory and practice of Design and a dedication to the improvement of U.S. Design education. I have written a number of articles for the professional journals and two books which have contributed to the establishment of Design as a formal discipline. At present I am the Professor in charge of the UCLA School of Engineering Design course.

In the late 1950's and 1960's, aided by a large Ford Foundation grant, I had the privilege of being the principal investigator of an extensive study that turns out to be quite pertinent to our topic today. The UCLA School of Engineering undertook an examination of engineering education that expanded into a thirteen year comprehensive study of the professions and their role in society. This work lead to a number of conclusions that challenged the conventional wisdom of the 60's. We predicted over fourteen years ago, when the U.S. was in a golden industrial era that we were headed for massive trade deficits, a reduction in productivity improvement and a lower relative national quality of life. As one instrument needed to turn aside the course the nation was taking, we recommended the creation of a National Problem Oriented Foundation to be the professions counterpart to the National Foundation on the Arts and Humanities and the National Science Foundation.

Let me begin my testimony by indicating my complete support and enthusiasm for the concepts embodied in H.R. 3839 and in particular for the direction it would provide the country. I would like to focus my testimony on what I consider the most important and insightful part of the proposal - Section 6 - that describes the National Design Program. Here is clear recognition of the impact of our national design capability upon our society, its economy, our international trade posision and ultimately the very quality of national life.

H.R. 3839 suggests the need for Design Policy and standards at a time when thoughtful citizens are recognizing the inadequacies of our present institutions. One does not have to be very astute to realize that the U.S. is in trouble. In the past ten years the U.S. has slipped from first to tenth place in the world for GNP per capita. Last year Japan produced over three million more cars than the U.S. auto industry that has long been the bastion of our economy.

ISSUES AND BACKGROUND

Let us briefly examine the issues and provide some further background. Let us also consider Design in its broadest sense as a responsible decision making process used to increase (optimize) the value of our precious resources and improve our societal environments. Resources would include human, business, civil, intellectual, education, health, etc., not merely our physical and material resources. Although H.R. 3839 concerns itself with design, quality and marketing, these are very important but still sub-optimization problems that can be addressed consistently only in terms of the larger problem of maintaining and improving national life quality. Our national life quality in turn, is a composite of the collective environments

created as a result of the resource allocation and environmental decision making responsibility of the public professions.* We shall see that leadership in Design and technical innovation, including invention of the latest production equipment, while very important does not guarantee a place in the market if the proper political, industrial, financial, management, etc., environments do not also exist. Unfortunately, these environments are so interrelated that they cannot be effectively treated individually. The uni-environment-uni-professional optimum solution will invariably become a systems disaster.

The UCLA predictions of declining relative life quality and productivity improvement were based upon five observations:

1. We observed the abandonment of the U.S. Land Grant tradition of higher education which has emphasized the professional schools design and cooperation among industry, government, universities and professions. It has been largely replaced with the British, Arts-Science two cultures, de-emphasizing the professions and practical matters to concentrate upon scientific excellence. (See Exhibits A and B for the historical background and the consequences for the U.S.) Unfortunately, the "trickle down" theory that says industrial competence automatically follows scientific leadership is not true. England espousing the trickle down theory has become an industrial basket case and the U.S. is following in its footsteps.

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* The societal environments include the health, education, political, industrial, civil, legal, etc., environments as well as the physical environment.

2. As a professor in a major university I found the second observation was hard to accept since it can be demonstrated that there is no connection whatsoever between a nation's basic research capability and its ability to compete in the world market place. While the English speaking countries, including the U.S. after World War II, directed their national efforts toward basic research instead of applied R and D, the rest of the world took another approach. Peter Drucker points out totally different countries such as Russia and Japan deliberately kept their scientific investment low. To quote Drucker:

> " It is not true that a modern country needs a science base. It can purchase it or import it."

Basic research is an international free good available for the price of the journals. Our competitors are directing their resources, including their best young minds into the Professions to improve their design capability and the national quality of life.

3. The U.S. was adopting the adversarial posture thathad failed in Britain - with government, industry, labor, education and the professions each trying to increase its individual return instead of the total good.

4. It has taken the U.S. over two decades to reach its present state. As far back as 1966, only a handful of U.S. industries such as agriculture, electronics, computers, aircraft and chemicals were thriving. Our success in these areas masked the fact that some 122 industries - auto, steel, ships, textiles - which formerly dominated world markets and employed thirty-five percent of the industrial work force - were running a $7.5 billion trade deficit. Prospering industries by and large still retained a cooperative partnership of government, industry, university and professions. Declining industries did not.

5. Finally, and most important, we observed the nation's institutions were not being changed to match the intrinsic structure of the problems of a modern society. We had a National Science Foundation for Science and a National Arts and Humanities Foundation for the Arts and Humanities. We did not have a National Foundation dedicated to national problem solving and design. Yet all of the nation's problems had become professions problems and all required multi-professions resolution. We did not find a single problem including International Trade or productivity that could be resolved by a single profession acting alone.

Table 1 shows the basic elements of three major national problems with a first approximation of the professions needed to find an answer. We note that Engineering has an important part in International Trade, but not the dominant role.

Today, as predicted fourteen years ago, the U.S. and Britain lead the world in two distinct areas: Nobel Science Awards and trade deficits. Japan and Germany on the other hand, contribute little to basic science but lead in international trade.

It is very important to realize that we are having problems in <u>every</u> professional area - not in trade alone. In education, U.S. achievement scores are edging down, with 20% illiteracy, whereas Japan has less than a 1% illiteracy rate. Crime in the U.S. is increasing; in Japan it is decreasing. In the field of pollution control, Japan started late, but it is now doing more than the U.S.

TABLE I.

NATIONAL PROBLEMS AND RESPONSIBLE PROFESSIONS

PROBLEMS	ELELENTS	PROFESSIONS
Auto Emissions	Health Effects	Medicine
	Physical Environment	Engineering, Meteorology
	Design	Engineering
	Production	Management
	Societal Acceptability	Legislators, Education
Drug Abuse	Physiological	Medicine
	Societal	Law - Social Welfare
	Education	Education
International Trade	Tax Policies Pollution Policies Patents Policy R & D Subsidy Capital Formation Anti Trust Policy	- Legislators
	Applied R & D Design	Engineering
	Finance	Legislators, Finance Accounting
	Manufacturing	Engineering, Management

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In the area of health, it is interesting that in 1950, when the NSF was established, the U.S. was sixth in infant mortality rate. By 1967, the U.S. was winning 50% of the Nobel prizes in Medicine, but had dropped to 18th for infant mortality and 21st for longevity. Today, the Japanese with little contribution to medical science are the world's healthiest people, with the lowest infant mortality rate and the longest life span.

It is essential that we recognize that our trade, innovation, productivity problems are but symptoms of a much larger and critical problem - the manner in which the country has organized its institutions to conduct its affairs. Our nation is entering the 21st Century with institutions largely designed for the eighteenth century. John G. Kemeny, chairman of the Three Mile Island Presidential Commission, has written a brilliant paper that should be read by everyone concerned for our country's future. (Exhibit C) The article shows Kemeny's original concern for equipment failure becoming a serious worry about how our nation can devise effective solutions to our immensely complex problems. Kemeny noted:

> "I've heard many times that although democracy is an imperfect system, we somehow always muddle through ... I am very much afraid that it is no longer possible to muddle through. The issues we deal with do not lend themselves to that kind of treatment. ...
>
> "What's principally lacking on the federal scene ... is the existence of respected, non partisan, interdisciplinary teams that could at least tell us what is possible and something about the pluses and minuses of different solutions. ... What I would love to see established ... is a team that will struggle the way our commission did and say, ... 'Here are six plans, any one of which is possible. We'll tell you what each one costs, what's good about it, what's bad ... how dangerous ... its uncertainties.' I would trust democracy - the President and the Congress - to choose among them; but I do not trust democracy to try to put together such a plan by having each committee of Congress choose one piece of it.

"My last point and the most important one is for our nation to recognize that the present system does not work. It was designed for a much earlier and a simpler age.

"The only way to save American democracy is to change the fundamental decision making process, at the federal level, so it can come to grips with the enormous and complex issues that face this nation."

HOW DID WE REACH OUR PRESENT STATE?

Let us contrast problem resolution in a healthy U.S. industry such as agriculture with the U.S. auto industry for example, and then with an emerging Japanese industry. U.S. agriculture is probably our most efficient industry providing a $17 billion trade surplus - yet U.S. agriculture is fragmented, highly diversified and dispersed, with thousands of products and millions of farms. It is nearly impossible for even the largest farmer to make a significant R & D contribution. Still, as a result of a long term partnership of government, industry, education and professions, U.S. agriculture is a highly technical, efficient industry. Government, with industry and university cooperation, subsidizes long term applied R & D. As an example, much of California's farm industry's farm machinery was invented at the University of California at Davis, which also created the California wine industry. The University not only solves the farm industry's problems but educates practitioners to implement the solutions - and this is quite important. A solution without trained minds to implement it is useless.

Our handling of auto industry problems such as exhaust emissions stands in sharp contrast to our agricultural system. Typically, a young bureaucrat, perhaps one of our graduates, without knowledge of the full physiological effects of emissions of the cost/benefit tradeoff of an extra 0.1¢ reduction of emissions will set standards without knowing if they are practical or useful. Each of four auto manufacturers will then independently consume their limited development funds to:

a) Investigate the basic phenomena;
b) Educate engineers in the problem;
c) Develop generic methodology to satisfy the requirement if it can be satisfied.

It is hard to imagine a more inefficient duplicative process.

Japan, a good example of our competition, has recognized the need for national policy and cooperative long term programs to further the national interest. After W.W. II, Japan set out to create the institutions necessary for an effective modern society. It took the best from the U.S. and other nations and improved upon them. Their leaders realized the advantages to be gained from the industrial application of the U.S. agricultural system.

Consider the Japanese Computer Industry as a model. Twelve years ago MITI (Ministry of International Trade and Industry) allocated $250 million to support six industry-university teams in three major computer projects over five years. The approach was highly successful in that it reduced IBM's share of Japan's computer market, laid the foundation of the computer industry and trained a large number of very competent computer engineers.

Six years ago Japan took the next step to complete the job by putting up $1.2 billion in a cooperative four year project to develop the basic technology for Very Large Scale Integrated Circuits (VLSI). The Japanese know large scale integrated circuits are the heart of the modern computer. The country that controls VLSI production will dominate the computer and information processing market. With the VLSI project completed, Japan has already captured over 50% of the 64K chip market and is expected to dominate the latest advance into 256K chip production.

The Congress should recognize that international trade competition is now between countries-not corporations. How many U.S. corporations can put up $1.2 billion to stay in the game?

The U.S. response to the Japanese initiative was interesting. Our justice Department moved to break up IBM - the only computer company large enough to finance a comparable development. Two years ago, the Defense Department finally advanced $300 million as a VLSI catch up program - four and one half years late. It is also seems strange to use the defense budget for largely civilian development. Note the magnitude of the money involved in this one area alone: $1.2 billion is ten times the NSF's total annual applied Science and Engineering budget. Funding in the limited amounts that the Congress has approved would indicate that the U.S. does not understand the nature and magnitude of international competition.

If the U.S. industrial structure seems inadequate and obsolete, our industrial capital formation process is medieval. Japan has created a financial structure that provides a Japanese company with five to nine times as much working capital as a comparable U.S. corporation with the same equity. In other words, if productivity is a direct function of investment in machinery, buildings, process and equipment - and I believe it is, for much of Japan's production equipment in semiconductors and robotics was originally designed in America - then the Japanese financial structure by itself gives its manufacturers an almost insurmountable competitive advantage.

Development of a national economic and fiscal policy which in turn created a new financial system to complement the national industrial policy illustrates how well the Japanese have recognized the importance of integrative national policies. Let us look a bit further at Japanese policy and planning.

With the country well on its way to control the basic components of the computer, Japan is now turning its attention to large scale computers and computer software. MITI has been supporting four (4) companies to develop super computer technology that will provide computer speeds 100 times faster than anything planned in the U.S. By 1988, Japan expects to lead the world in super computer production.

A high standard of living generally means high labor rates. In anticipation of an increasing living standard, Japan presently employs in manufacturing over 50% of the free world's robots. Robots are used to manufacture more robots and Japan is the world's leading exporter of robots. The "Unmanned Factory" is a national project begun by MITI in 1977. By 1984 Japan expects an unmanned factory with ten technicians to produce the same amount of product as a conventional U.S. factory with 700 employees.

Educational policy is an integral part of the national industrial strategy. Twenty percent (20%) of Japanese undergraduates are studying engineering while forty percent (40%) of the masters are in Engineering. By contrast, Engineering provides only five percent (5%) of the U.S. undergraduate degrees. As a consequence, Japan with half the population of the U.S. graduates twice as many engineers. The discrepancy between U.S. needs and actions are highlighted in California which graduated 1788 electrical engineers and 1581 lawyers in 1970. By 1980, the need for engineers was becoming critical, but California produced only 1277 electrical engineers and increased its output of lawyers to 5430. Southern California is said to have more lawyers than all of Japan.

There is a tendency to overlook Japan's stunning ability to develop and implement successful national policies by attributing their accomplishments to Japanese character and traditions. In most cases we are deluding ourselves for much of what we accept today as Japanese tradition is of very recent origin.

This is illustrated perhaps most forcefully by Japanese financial policies. Japanese industry borrows money at an average rate of 9.3% while the U.S. cost of capital is 17.5%. With lower capital costs and the ready availability of funds for expansion, Japanese industry is ideally situated to sell at lower prices and capitalize on emerging markets. Today the U.S. National Semiconductor Corporation has been forced to delay completion of a new $50,000,000 chip facility while Nippon Electric pushes ahead with a $100,000,000 semiconductor factory in Sacramento. To complete the picture we should also realize that the Japanese government gives its chip manufacturers special tax privileges, low interest loans, a direct subsidy of about $400 million each year and a 10% tariff against all imported chips.

The availability of capital funds must ultimately relate to the manner in which a nation's citizens employ their disposable income, i.e., the national policies toward savings. Japan was once a nation whose leaders complained that "when workers get their pay in the morning, they spend it in the evening." In 1930 the Japanese saved only 5.8% of their disposable income. Last year Americans saved 5.6%. By 1973, however, the Japanese became the world's champion savers putting more than 20% of their disposable income into savings. The reasons for this drastic change in national "character" are very simple. A new fiscal policy was needed to finance Japan's expansion. Consequently, their tax laws were modified to encourage savings by allowing a salaried worker in Japan to receive tax free interest on savings accounts up to $63,043. In the U.S. the new All Savers certificates allow an American to avoid taxes on about $7900.

WHERE DO WE GO FROM HERE?

The present system is not working for the U.S. There are serious structural omissions and inconsistencies that have become too costly to leave uncorrected.

Scientific leadership does not translate into economic strength. Innovation by itself is not the hinge pin of International Trade. Engineering acting alone cannot turn the tide. Professor Myron Tribus observes the U.S. and Britain did 90% of the basic research and innovation on liquid crystal displays while Japan manufactures 90% of the commercial product. Economist Michael Boretsky has found that the U.S. produced 17 out of 18 major breakthroughs in semi-conductor electronics between 1965 and 1977, including the invention of the transistor. During the same period of time the U.S. trade balance in electronics and communication equipment (excluding only computers) slid from a positive $300 million to a negative $2 billion. It seems we need more than just technological innovation. With production machinery readily available on the international market, productivity is as much a function of tax policy and capital formation as it is of design competence.

The growing inability of the nation's existing institutions to cope with our mounting problems ensures that the time has come for new institutions and a reorientation of existing programs to emerge. And indeed, H.R. 3839 is among a growing list of proposals designed to cope with all or part of the national need for institutional change. Of particular interest is the widespread recognition of the need to create and review national policy in many areas. To mention a few:

C. Sporek, president of National Semiconductor, said:

> "We must have an <u>industrial policy</u> ... Someone must decide - don't ask me who - whether we want an information processing industry or not."

The United States Activity Board of the Institute of Electrical and Electronic Engineers, IEEE, with over one million members unanimously recommended that the U.S. adopt a National Technology Policy to revitalize our productive capacity.

Representative Richard Bolling and John Bowles in their book America's Competive Edge speak to the creation of a balanced economic policy, a global trade strategy and national trade consciousness.

In addition to H.R. 3839, other bills have been introduced to address the various parts of the policy issue. H.R. 3749, The National Technology Foundation Bill, is a well thought out proposal to advance the nation's technology and engineering. H.R. 3817, the National Professions Foundation Act, first introduced in 1973, recognizes the essential multiprofessional nature of the nation's problems and proposes a Professions Foundation to be the nation's professions policy counterpart of the National Science Foundation and the National Foundation on the Arts and Humanities.

LET US NOW TALK ABOUT POSSIBLE SOLUTIONS.

Resolution of our national problems must be multifaceted as no single act by itself will do. Industry requires:

a) A constructive tax structure;
b) A partnership with government, education, professions and labor instead of our present adversarial posture;
c) Means for acquiring adequate financing at any reasonable cost; and
d) An enlightened patent policy.

The society requires:

a) Improvement of all environments for which the professions bear responsibility, i.e., the quality of life;
b) Protection from both pollution and resource shortage;
c) A means to formulate, evaluate and institute national policy alternatives;
d) A means to change its institutions to meet new requirements.

All significant national issues hinge upon questions of resource allocation and environmental decision making, i.e., they are all professions problems. Every major issue now and in the future requires a multi-and inter-professions resolution that is not readily available within the individual scopes of the three bills: H.R. 3749, 3817, and 3839. Yet the basic concepts embodied in the bills are excellent and not conflicting. Therefore, we propose consideration of a National Professions, Design and Technology Foundation to include the Design, resource allocation and environmental decision-making responsibility of the public and design professions in the interest of the national life quality. It is expected that the Foundation would provide an adaptive mechanism to consider and address our societal problems. It would also be charged with the responsibility of developing for the Congress a set of integrated national policies to serve the long term national interest. An open forum for industry, education, government, labor and the professions would be created to supply the factual foundation for national decision making and resource allocation. The Foundation would serve as the basic institution needed to advance the partnership of industry, government, labor, university and the professions that is required to resolve the nation's societal and economic questions.

APPENDIX

The National Professions Foundation has been endorsed by a number of the nation's leading professional organizations such as the National Society of Professional Engineers, the American Society of Civil Engineers, the Los Angeles Bar Association, the Association of Schools of Allied Health, the American Association of Collegiate Schools of Business, the National Association of Social Workers and the Adult Education Association.

(See Appendix D.)

EXHIBIT A

THE NATIONAL PROFESSIONS FOUNDATION AND THE FUTURE QUALITY OF NATIONAL LIFE

By

Allen B. Rosenstein

Professor of Engineering

U.C.L.A.

Presented: American Association for the Advancement of Science
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Symposium: The Practise of Engineering
vs. The Pursuit of Science

Friday, January 5, 1979, Shamrock Hilton

THE NATIONAL PROFESSIONS FOUNDATION AND THE FUTURE QUALITY OF NATIONAL LIFE

By Allen B. Rosenstein
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SUMMARY

This article is based upon a set of postulates which differ markedly from the current conventional wisdom of the English speaking countries including the U.S. It is our premise that the conventional wisdom of higher education of these nations departs sufficiently from reality to insure a long term misappropriation of resources and a consequent decline in the obtainable quality of national life. The postulates shall be listed and briefly explored to offer one view of the present. Two alternative futures shall then be constructed - one based upon present trends and the other upon what "should be" if suitable change agents including in particular the National Professions Foundation are made available in time.

Emphasis upon the unique societal role of the professions makes a brief operational definition of the word "Profession" appropriate. In this sense a "Profession" means a body of persons engaged in a calling which requires specialized knowledge and extensive educational preparation, which has a significant relationship with public affairs and the allocation of societal resources, which is accountable to constituencies and to the public, and which includes accounting, architecture, dentistry, education, engineering, journalism, law, management, medicine, nursing, pharmacy, public administration and legislation, public health, social welfare and urban planning.* The consequences of this view of the professions is given by the following postulates.

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*The listed professions have sometimes been called the public professions because of their accountability to the public.

POSTULATES:

1. Postulate: Every major domestic issue is intrinsically a professional matter.

Society has become so complicated that the day of the gifted amateur who deals effectively in substantive national issues is gone forever. Without exception, every important national question is of such magnitude that it cannot be understood, much less resolved, without years of education and experience in the professions.

2. Postulate: Essentially all resource allocation and environmental decision making of a modern nation is undertaken by men and women acting in a recognized professional capacity.

Engineers bear responsibility for the allocation of most of a nation's physical resources which in turn create the physical environment in which we reside. Educators are responsible for development of our intellectual resources and the educational environments. Doctors allocate our medical resources and management creates the work environment. Politicians may be considered the master professionals drawing upon the expertise of the other professions to allocate governmental resources and establish the laws and policies for the civil environment. The totality of environments determine what has been called the National Life Quality. The objection might be properly raised that the foregoing is not entirely true. Managers frequently allocate physical resources with advice from engineers - and the public certainly advises their politicians. But having said this the fact remains that the specialized knowledge and experience of the professions is vital to the effective functioning of society. Society has created the professions to both establish and identify those groups responsible for and capable of environmental decision making and resource allocation. At the

same time the society insures that the professions adequately serve the public by demanding public and legal accountability, licensing, demonstrated proficiency, and with increasing frequency substantial financial liability for the consequences of professional decisions.

3. Postulate: The national life quality is a direct function of the effectiveness of the nation's professions.

If indeed, the nation's environments are the result of professional resource allocation and environmental decision making, the assumption of dependence upon professional effectivity must follow.

4. Postulate: Popular mythology to the contrary, there is no positive long term connection between a nation's life quality and the status of its basic research establishment.

Postulate #4 complements the preceding postulate emphasizing the fact that knowledge gained from basic research is an international commodity while the expertise of a nation's professions is the decisive domestic commodity that establishes the national life quality. Although academic folklore insists that the more money spent upon basic research the better, there is considerable evidence to the contrary. During the 1970's the U.S. and Britain have led the industrialized world in both Nobel prizes and international trade deficits. Following the post WW II reconstruction period, England and the U.S. turned their attention with unqualified success to the further improvement of their basic research endeavors. From 1951-1976 the U.S. captured 59% of the Nobel science awards. In the same period Britain led the world in Nobel prizes per capita. Japan on the other hand with hardly a Nobel laureate to its name has taken a commanding trade position as has Germany with its Nobel science awards now down to nearly one third their pre-WW II level.[1] Data for the past thirty years would indicate that beyond some

nominal committment further increases in the national basic research budget will adversely affect both international trade balance and annual rate of GNP increase.

5. Postulate: The effectiveness of a profession is dependent upon education for the profession.

The graduate performs with the models and methods derived from his education. He or she is in effect the creature of education for the profession. As we shall see the comparatively poor life quality performance of the English speaking countries over the past three decades must be cause for concern requiring a critical reexamination of education for the professions.

6. Postulate: While the important national issues are always professional problems, not one significant question can be resolved by a single professon acting alone.

Modern society has become so complex and interrelated that all important issues are multiprofessional and in turn require a multiprofessional resolution. Although we educate professionals in an insulated fashion that insures the uniprofessional answer, case after case of uniprofessional solutions leading to total failure have now been documented. Indeed, it can be proven that the optimum uniprofessional solution to large scale societal problems must in general result in a system disaster.

HISTORY

A Bit of History is offered to provide some justification and background for our postulates and their consequences and for the changes in our institutions that should follow.

During the nineteenth century, and for the first half of the twentieth, higher education in England, the U.S., and Continental Europe developed along different paths. When the Continent turned to higher education for

the leadership and trained minds necessary to emulate the British industrial revolution, science and the pursuit of knowledge so dominated the classical university that although law, medicine, and theology, were long established, the other professions were unable to gain university acceptance. The problem was resolved when national leaders such as Bismark and the Kaiser lent their prestige to the establishment outside the traditional university of the Technische Hochschule for the professions. Early success of the Technische Hochschule on the Continent led to a three way separation into Kunst -- art, Wissenchaft -- the scientific approach to all formally expressed knowledge, and Technik -- the useful. Today, Technik is generally taught in Europe in separate technical universities quite apart from the classical universities that teach Wissenschaft. Kunst, the fine arts, has been taught in a number of separate schools and conservatories.

Across the English Channel, higher education did not divide. When Parliament belatedly realized Britain needed but did not possess the counterpart of the Technische Hochschule, the leaders of educational thought in Britain were under the spell of Newman's lectures, Pattison's essays, and Jowett's teaching. It is not surprising, therefore, that they opposed the segregation of technological education into separate institutions. There was the deep conviction that scientific and professional education should not be separated from liberal studies. The manager-technologist must also enjoy the benefits of a liberal education or at least he must rub shoulders with students who are studying the humanities. Thus the traditional English University provides education in the arts, sciences, and professions. But the sequential establishment in English higher education of liberal learning followed later by the sciences and finally the professions, has left a subtle British bias toward the arts and science. This viewpoint is probably

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best shown in C.P. Snow's "Two Cultures."[2] Snow sought to improve man's lot by seeking a bridge between the two cultures of the arts-humanities and the sciences, with no consideration or recognition that our quality of life is determined by the professions. The British desire to ignore Technik results in some amusing habits such as calling engineers "scientist" and the creation of bureaus for "science policy" which tend to include "applied science" and exclude the professions. It has had some not so amusing results as the professional schools ape the sciences to gain respectability, and ignore the pressing needs of the country. Michael Fores in an article entitle "Applied Science is Pure Nonsense in Myopic Britain" summarizes the art-science syndrom by observing:[3]

> ". . . it is the foundation of the slow suicide of a group: a sure way of how not to succeed as a nation without really trying to discover why. Any grasp of the Technik concept would help in this discovery."

In the U.S., the great state universities created in the land grant image emphasized agriculture and mechanics. The state universities were basically professional schools turning out the practitioners of engineering, teaching, manufacturing, management, agriculture, etc. needed to build a nation.

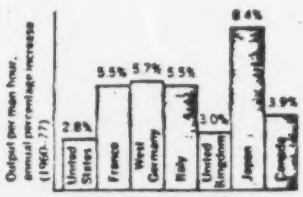
Before WW I, the U.S. imported most of its new scientific knowledge and advanced technology. As a result of WW I, the American industrial plant was established, but the U.S. continued as a substantial importer of science. With the advent of WW II, the U.S. industrial plant was extended and a new era of scientific investigation began. In 1950, the National Science Foundation was established mainly to improve the quality of the nation's science and mathematics. This admirable institution has conducted its

affairs with vision and an awareness of the long term interests of the country. Unfortunately, the prestige and financial power of the NSF, together with public preoccupation with science, have severely warped the very fabric of the U.S. university.

At a time when U.S. technology and professional management were being recognized throughout the world, a counter trend was developing in the U.S. universities. The visible signs of achievement and national recognition afforded by a National Science Foundation grant became irresistible on the campus. The warming flow of prestige, graduate students and promotions that accompanied the flood of science money found no natural enemy to maintain the normal balance in the academic jungle. One hundred years of land grant tradition was slowly but surely replaced by the basic research orientation of the English, and classical German universities. However, without the balance of the continental Technische Hochschule, we are now repeating English history to once again demonstrate that possession of scientific knowledge does not transmit easily into economic strength, or improved life quality.

The redirection of the university has had rather uniform effects upon the professions in the U.S. In 1950 when the NSF was first funded, the U.S. ranked sixth in infant mortality. By 1967, the U.S. was winning 50% of the Nobel prizes in medicine and the life sciences, but had dropped to eighteenth place for infant mortality and twenty-first for life span. At the same time the cost of U.S. health services has now risen to the point where it is questionable that even the U.S. can afford them. The confirmation of the U.S. medical schools as graduate research institutions has also made the cost of medical education prohibitive. Today, approximately 50% of the physicians entering U.S. practice have been educated abroad. There are more Thai doctors practicing in New York City than there are serving Thailand's rural population of 28 million.

Other professions in the English speaking countries present a somewhat similar picture. Britain in 1968, was spending a higher percentage of its gross national product on R&D than any other country in Europe and yet it had one of the lower economic growth rates. Japan, in contrast, with less than half the British expenditures on R&D had an economic growth rate that was three times that of the United Kingdom. England's inability to translate into an economic advantage the basic research that gave it radar, jet engines, antibiotics, etc, is being repeated in the U.S. Thus, in the period from 1947 to 1960, when the U.S. took a commanding lead in Nobel prizes for physics and our total national research expenditure tripled, the rate of economic growth dropped from 3.7 percent per annum to three percent. Between 1973 and 1975, the U.S. productivity rate actually declined in six out of seven consecutive quarters. In the first five years of the 1970's, the level of industrial productivity in Sweden rose 11 percent faster than ours, 17 percent faster in West Germany, and 24 percent faster in Japan. Western Europe and Japan are expected to maintain a better than two percent per year improvement edge over the U.S. for the next decade.[4] The inability of the English speaking countries to provide a significant improvement in their productivity over the past 17 years is clearly shown in the following chart where Canada, Great Britain, and the U.S. lag far behind Western Europe and Japan.[5]



[1] Although the absolute productivity level in the U.S. remains high compared with other industrial nations, annual productivity gains in terms of output per man-hour are among the lowest.

Productivity and GNP per capita are closely related. At the close of WW II, the U.S. led the world in GNP per capita. Today we are in fifth place and will shortly drop to seventh as Japan and Germany pass us.

If for no other reason than the need to develope and maintain an appropriate level of competition in the international market place, the English speaking countries must ultimately reevaluate the consequences of their present modes of education for the professions. In 1964, the U.S. enjoyed a favorable trade balance of $7 billion which shrank to $4.1 billion by 1967. Ten years later the favorable trade balance had steadily eroded to become a 1976 trade deficit of $5.9 billion which then ballooned to a negative balance of trade of over $26 billion in 1977. A weak argument can be made that the inbalance was aggravated by the high price of imported oil. But this argument fades when one realizes that Japan, importing essentially all of its oil and raw materials, racked up a world wide trade surplus of over $16 billion in the same year.

The U.S. economic future looks quite bleak when our trade position is examined further. We find a pattern being repeated for product after product. At the end of WW II the excellent high voltage laboratories of two West Coast U.S. universities were replaced with a physics laboratory in one case and a linear accelerator in the other. Some ten years later much of the advanced extra high voltage transmission technology used in the U.S. was being imported from Sweden. By the mid 1960's, the U.S. dominated the world markets in only a few areas, such as: agriculture, computers, aircraft, and electronics. Chronic trade balance weakness had appeared in at least 122 manufacturing industries. Among them: steel, paper, leather, glass, textiles, apparel, shoes, shipbuilding, autos, watches, and sporting goods. In 1966, these 122 industries provided 35% of the nations' industrial jobs, but ran up a hefty $7.5 billion trade deficit.[6]

The last decade has not improved our manufacturing posture. In spite of the U.S. invention of the transistor and an overwhelming commitment to basic solid state research, we have not been able to sustain the consumer electronics industry. The last U.S. television manufacturer has given up its U.S. plants. Within the past two years, Japan has completely dominated the burgeoning CB radio market. The lack of correlation between a nation's basic research ability and its prowess in the marketplace is dramatically illustrated by the charts of Appendix 1. Although U.S. corporations have made seventeen out of the eighteen major breakthroughs in semi-conductor electronics, Department of Commerce economist, Michael Boretsky, points to a U.S. trade balance in electronics and communication equipment that continues to slide deeply into the red.[7]

Loss of the consumer electronics market leaves the U.S. dominant in only agriculture, computers, and aircraft. However, even these strongholds are not too secure. A government financed European consortium has produced the airbus to challenge U.S. aircraft manufacturers and we face increasing Japanese competition for the international computer market. At the beginning of the 1970's, the Japanese Ministry of International Trade and Industry (MITI) concluded thet "The Computer Industry is the future money-earner in Japan." MITI grouped six major Japanese companies with the leading engineering schools into three development ventures and over five years contributed some $225 million in applied research and development subsidies. The program paid off in the development of a new series of computers that has helped cut IBM's market share in Japan. Currently MITI is spending $1.25 billion over four years to develop the next generation of very large scale integrated circuits for the computer industry. Fairchild Camera and Instrument executives

state that their industry is now competing with "Japan Inc." and report that the Japanese have made no bones about the fact that they want to be the IBM of the world in the 1981-82 time frame[8].

Discussions of world trade and the quality of national life might seem out of place in an article upon education for the professions. However, it is our premise that educational policy for the professions is a fundamental determinant of the economic prowess of a nation and the status of the national environments. Having concluded that the English model of higher education has a fatal flaw which the U.S. failed to avoid when it moved away from the highly successful land grant tradition, let us now examine the futures available to us.

TWO FUTURES

Two Possible Scenarios shall be considered, to present a suitable range of feasible futures. Which, if any, will be realized, depends of course, upon the vagaries of national policy and the wisdom of our educational leadership. The first scenario is an analysis of the consequences of existing trends in English speaking universities including the U.S. Based upon present tradition this somewhat pessimistic projection has the higher probability of being realized. The second scenario looks to a break with tradition and a reorganization of the university to obtain compatibility with the intrinsic structure of the environmental problems of modern society.

SEENARIO I

The present imported climate in the U,S. university can be best understood by examining its British counterpart. England's Sir Eric Ashby, who notes that the English Universities played no part whatever in the British industrial

revolution, wrote in 1968, when contrasting British and Continental universities:[9]

> "the British pattern sets its problems too. It was difficult enough for British universities to adapt themselves to scientific thought; it is proving much more difficult for them to adapt themselves to technological thought. For pure scientific research to akin to other kinds of scholarship: it is disinterested, pursued for its own sake, undeterred by practical considerations or popular opinions. There is no great divergence between the attitude of the physicist toward the concept of entropy and the attitude of the philosopher toward the concept of virtue. But teaching and research in technology are unashamedly tendentious, . . . Technology is of the earth, earthy; it is susceptible to pressure from industry and government departments; it is under an obligation to deliver the goods. And so the crude engineer, the mere technologist (the very adjectives are symptoms of the attitude) are tolerated in universities because the state and industry are willing to finance them. Tolerated, but not assimilated; for the traditional don is not yet willing to admit that technologists may have anything intrinsic to contribute to academic life. It is not yet taken for granted that a faculty of technology enriches a university intellectually as well as materially. The attitude of universities toward technology is still ambiguous; until the ambiguity is resolved the universities will not have adapted themselves . . ."

Reinforced by the unqualified success and unchallenged effect of the National

Science Foundation in academia, the extending consequences of the "British pattern" provide the basis for our first view of the future. The effects upon faculty and consequently curricula will continue to be pervasive. With the criteria for appointment and promotion of professional school faculty now coinciding in practice with those of the scholar scientist, the distinction between science faculty and professional school faculty will continue to disappear. Engineering will draw more of its faculty from physics and mathematics. Few if any professors of engineering will be professionally licensed or have industrial experience or interest.[10] Similarly life scientists become easier to promote than clinicians and will occupy more slots in the medical faculty. In schools of education, the Ph.D. replaces the Ed.D. as research sociologists and psychologists are appointed. Schools of management are more attractive to applied mathematicians, operations researchers, and mathematical programmers with a decrease in management practice.

The above trend which lays the foundation for a national tragedy stems from the fundamental and normal desire of all professors to replicate themselves. As the faculty became more "scholarly" and less professional, they and their students have less interest, experience and ability to execute the responsibilities of the professions for the resource allocation and environmental decision making that the nation requires to maintain the national life quality.

As example, the ability of our engineers and managers to design and manufacture products that compete successfully in a cost, quality and reliability oriented international market has already dropped significantly.[11] With the present trends in engineering and management schools, we can expect a continuing

deterioration of the U.S. economic position. If history repeats itself and the stage appears set for such a repeat performance, the deterioration will be rapid. History tells us international juries awarded British products most of the prizes for the hundred categories of manufacturers at the 1851 International Exhibition. Sixteen years later at the 1867 International Exhibition held in Paris, British products received a bare dozen awards. The difference is attributed solely to changes in education for the professions. With the British industrial revolution created outside the unviersity (and normal publication channels) and with the export of British 'knowhow' prohibited by law, the countries of the Continent had to discover new technology on their own. They responded in the 1850's and 60's by creating the Technische Hochschule and the Polytechniques to produce a new species of professional man: the manager-technologist.[9] By 1867 the job was done and Britain lost, never to recover, its industrial advantage.

U.S. professional education by converting from the land grant model to the English "two cultures", has succeeded in insuring the same industrial disadvantages realized by the British. Without substantial outside pressure for change that does not now exist, the course of U.S. education for the professions and its consequences are predictable. The differences between the schools of science and the professional schools will continue to decrease. The declining market for research Ph.D.'s causes science and mathemetics departments that formerly offered only the "purest" of programs to quietly add 'applied mathematics' and 'applied physics'. On the other hand, the professional schools driven by the changing faculty composition and an overwhelming desire to find academic respectability continue to replace Technik with Wissenschaft. One manifestation is found in the flight to graduate status,

The U.S. and Canada are practically the only countries in the world where education for any profession begins in graduate school. Everywhere else the student commences professional study including medicine and law immediately upon matriculation in the unviersity. U.S. law and medical education became graduate offerings at the turn of the century as a successful Draconian measure to recover from the subprofessional state to which these professions had been driven by diploma mills. The current prestige of law and medicine has invited emulation. In many U.S. universities education for management, education, accounting, social welfare, architecture, urban planning, dentistry, public health and nursin is available only at the graduate level. But in the U.S. university, the graduate school exists primarily for research. Thus, education for Technik moves from its old undergraduate home into what is now the accepted Wissenschaft arena.

The overwhelming expense of graduate research training and the extensiveness of its mismatch with the demands of a professional career insure the ultimate demise of the present form of the U.S. professional school. There is always some point where the cost of an institution has become so high and the return so low that the host society can no longer provide support. Several feasible alternatives including the Technische Hochschule and the original land grant college are available. In Latin America where the old autonomous universities are often incapable of changing rapidly enough to satisfy societal requirements, we find governments creating new universities which turn out to be modern land grant colleges or Technische Hochshule.

The retreat to graduate studies and the increasing similarity of the professional schools and science departments opens another possibility for

the retirement of the professions. The case of the School of Criminology at a major western university could turn out to be a classical forerunner of things to come. In this instance the school was formed a number of decades ago. At that time the state realized that while a large percentage of its resources were expended for the state's police departments, there was not a single first rate institution for professional education in criminology in the West. Recognition of the school came rapidly. Professional contact and cooperation were established with the principal state and city law enforcement agencies. Within roughly a decade, the school established the guidelines and standards for modern police work throughout the state. Then, responding to criticism that its professional work was outstanding but that it had not done quite enough basic research, the school sought and appointed a few research sociologists. Easily meeting the campus criteria the sociologists prospered and bred more sociologists. These professors, however, were not too sympathetic to the professional problems of the police and began to advocate adversary positions. With time the split became so great that members of the School of Criminology, who were very busy with their research anyway, were no longer welcome with the police departments and professional contact died. Ultimately in its regular review of its schools and colleges the university examined the faculty and work of the School of Criminology. It was found to be staffed with sociologists who were undertaking research in sociology that the university concluded could be conducted just as effectively in the sociology department. Confronted with the question, "Can the university afford a second department of sociology?", the School of Criminology was terminated. This question of a second school or even of a second rate school of science must ultimately be faced by every professional school that forsakes Technik for Wissenschaft.

ANOTHER FUTURE

The Second Scenario is more optimistic than the first. It assumes that powerful change agents can be generated to obtain significiant revision in the structure and programs of the discipline oriented, tightly compartmentalized, conservative U.S. university before the society decides upon more drastic measures. To realize this future let us look first to a viable structure for the university and then to the form of the professional school programs that will be created within that structure. There seems little hope that multiprofessional programs directed to society's problems can exist in the present U.S. university without organizational changes. However, reexamination of the activities of the large university reveals again the three major intellectual and educational foci that intersect fundamental requirements of modern society. These are:

1. The extension and preservation of our cultural heritage and cultural environment - The Arts and Humanities - Kunst.
2. The pursuit of knowledge for knowledge sake - The Physical, Life and Social Sciences - Wissenschaft.
3. The preservation and improvement of the national quality of life and education of the nation's public environment decision makers - The Professions - Technik.

The importance and funadmental nature of the above activities causes us in this scenario to propose that the need to substantially increase the scope and effectiveness of the university's contribution to its society will cause the restructuring of the modern university about the three major divisions of:

The Professions

The Sciences

The Arts and Humanities

Each division will have a clear statement of its societal responsibilities that will be reflected in curriculum and staffing criteria.

We assumed earlier that the truly important problems of our society require multiprofessional resolution which in turn requires professionals educated to perform in a multiprofessional mode. A Ford Foundation funded study of the professions has shown that regardless of profession, the practicing professional is always looking for the best methods to optimize (improve) in the face of constraints the value of the resources for which the profession is responsible[12]. The preceding statement gives a common curricular framework for all professions with common components that lead to seven very general stems about which education for the professions can be most effectively organized.

PROFESSIONAL CURRICULUM FRAMEWORK

STRUCTURE	COMPONENTS		STEMS
Methods	Professional Method (Design)	-	Professional Method
	Analysis (Mathematics)	-	Applied Mathematics
	Experimentation	-	Laboratory
Constraints	Humanities and Fine Arts Social Sciences	-	Applied Humanities
	Life Sciences Physical Sciences	-	Applied Science
Resources	Information	-	Information Processing
	Materials Energies People Organizations and Systems Space Time	-	Resource Processing

The rationale of this structure and the seven stems is clear. The methodologies of experimentation (laboratory), analysis (applied mathematics) and synthesis (professional method*) are required of all professions. To enhance his or her probability of success, the professional seeks to avoid violation of the constraints upon his decision making freedom which arise from basically two sources — the laws of nature and the laws, mores, customs, and values of society. In turn, differences among professions arise not in methodology or constraints but almost entirely from the resources for which the society has delegated professional responsibility for processing and allocating.

*The Professional Method which the engineer has called "Design" is emerging as a formal decision making and resource allocating descipline which is taking its place alongside mathematics as a basic tool of the professions.

Reflecting the growing collective public responsibility of the professions, the new University Professions Division will move to strengthen the links between professions and to provide education allowing professionals to be more responsive to societal requirements. Common undergraduate stems in the "Applied Humanities" and the "Professional Method" will be required of all students of the professions. Thus the techniques of societal value system creation and evaluation will be presented alongside the formalized methodology available for resource allocation and environmental decision making. Building upon this Applied Humanities and Professional Method background, education for the professions will include an extensive experience in societal and educational assessment. By bringing educational and societal assessment into the regular education process with student, faculty, government and industry participation in multiprofessional reviews of national programs, a significant resource is made available at little incremental cost. At the very least an effective mechanism will exist for the institutionalizing of change in higher education.[13]

THE NATIONAL PROFESSIONS FOUNDATION

The university in its present form is incapable of internally initiated, societally directed change. Historically, change has been forced upon higher education. The Technische Hochschule was the Continent's response to English manufacturing superiority. Likewise, in Britain it was only when industry and government demanded action to regain Britain's lost industrial position that science and then the professions were slowly and reluctantly given place in British universities.

The National Science Foundation is probably the most successful educational change instrument created. Within one generation after the NSF began operation the land grant institution tradition was largely replaced and even liberal education suffered. The extent to which Wissenschaft had supplanted Technik and Kunst can be illustrated by one grotesque example. The UCLA School of Music faced with the opportunity to appoint one of the world's greatest violinists chose to measure and reject on the basis of publications. By the mid-1960's, liberal learning in the U.S. was in such disarray that the arts and humanities, seeking to survive, joined forces and lobbied the government to successfully establish the National Foundation for the Arts and Humanities. With Kunst and Wissenschaft now served by their respective major national foundations, the time has come to balance the forces playing upon the university ecology. This need for balance in the university and for a vehicle for industry, government, professions, and university cooperation in the national welfare has been recognized by a number of leading U.S. professional societies including the National Society of Professional Engineers, National Association of Social Workers, American Society of Civil Engineers, American Assembly of Collegiate Schools of Business, Los Angeles County Bar Association, Association of Schools of Allied Health Professions, etc. Congressional support has followed with a bill to create the National Professions Foundation introduced before the 94th Congress.[14]

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With the passage of the National Professions Foundation Act, the Foundation would function to -

1) Develop and encourage the pursuit of a broadly conceived public professions policy which supports the national interest;

2) Develop and maintain suitable social indicators in cooperation with other agencies and the public professions to measure the quality of national life as a composite function of the public environments; i.e., the physical, civil, health, education, business, legal, social etc. environments,

3) Establish a coordinated multiprofessional effort by the public professions that would:

   a) develop methods to define and assess national problems and needs,

   b) conduct ongoing studies to determine approaches, resources and priorities to meet such problems and needs, and

   c) encourage and facilitate cooperative government, industry, university and professions programs to resolve important national problems and needs;

4) Assess existing and proposed public professions programs and policies with a view toward:

   a) predicting the impact of such programs and policies upon the national quality of life; and

   b) suggesting, whenever necessary, alternative programs, policies and resources;

5) Study and evaluate the operation of the public professions including their delivery of services and societal effectiveness;

6) Conduct studies designed to evaluate and improve the public professions curricula of educational institutions.

It is interesting to compare the above NPF functions with the following recommendations to the U.S. Congress by the U.S. Activities Board of the IEEE.[15]

i. Methods of encouraging and facilitating Government-Industry-Academic cooperation should be examined

ii. A means should be found to permit the exchange of personnel between Government laboratories, industry and the universities

iii. Methods should be examined whereby merged or combined cooperative research can be performed in the U.S. in such vital areas as very large scale integration, bring into account the current anti-trust laws

iv. An urgent need exists for the proper definition and description of the dynamic system we call technology

v. There is a need to identify and nurture future technologies that are likely to become important to the national interest.

The National Professions Foundation Act is specifically designed to reestablish the Technik of the professions in our society and universities. Particular attention would be given to the professions counterpart of the agriculture extension act. Aggie extension has made U.S. agriculture the envy of the world by maintaining a long-standing partnership between farmers, government, and education. Long term financial support and encouragement are provided by the government. Advanced development, applied research and information dissemination are undertaken by the universities. U.S. professional schools cooperate with the farm industry to solve major agricultural problems and concurrently educate farmers in the latest agricultural methods. As a consequence of

of national policy, the farm industry automatically turns to university professional schools for resolution of problems beyond the industry's resources while the university with government support recognizes and assumes a responsibility for agricultural education, development and research. The magnitude of our national problems and the nature of international trade competition requires financial and intellectual resources that are now far beyond most local organizations and industries. To successfully maintain the national life quality and compete in the world markets calls for organizations and cooperative efforts that do not now exist. Not only would the NPF continue the initial defense motivated alliance of industry, government, and university that fueled development of our computer and aircraft industries but it would follow the agriculture example to extend the partnership of professions, government, industry, and education to improve all facets of the national quality of life and national productivity.

CONCLUSIONS:

Our first rather pessimistic scenario offers a linear projection of the present situation with the university mired in its own internal organizational morass and government and industry too bemused with the English science-arts model to effect any change. Realization of the second more desirable future awaits the creation of suitable change agents such as the National Professions Foundation and emergence of the University Professions Division. These in turn require concerted action from industry, government, and the professions to set in motion the kind of change and change agents that the university has never been able to generate internally in all of its long history. With generations of tradition behind it and mountains of laurels to rest upon, U.S. higher education will not seek nor take responsibility for the future quality of national life unless the greater society provides an unequivocal mandate.

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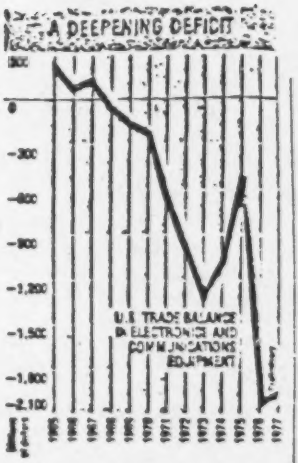
Where the U.S. Leads at Innovating ...

MAJOR ADVANCES IN SEMICONDUCTOR ELECTRONICS

TRANSISTOR EFFECT	Basic discovery that a crystal of semiconductor material can receive a modulated	U.S.	1947
JUNCTION TRANSISTOR	Transistor whose crystal has "junctions"—planes at which the type of electrical conductivity changes from positive to negative	U.S.	1942
CRYSTAL "PULLING"	Technique for growing a single crystal of transistor quality from molten material	U.S.	1949/ 1950
ALLOY JUNCTION TECHNIQUES	Commercial process of forming "junctions" in crystals—of significance in the early transistor era	U.S.	1951
FIELD-EFFECT TRANSISTOR	Type of transistor in which motion of electronic charges is controlled by an impressed electric field	U.S.	1951/ 1955
ZONE REFINING	Technique for removing unwanted impurities from a crystal	U.S.	1951
DIFFUSION	Technique for introducing desirable impurities into a crystal	U.S.	1954
III-V COMPOUNDS	Combining elements from groups III and IV of periodic table used in solid-state lasers, LED's, microwave devices	GERMANY	1955
OXIDE MASKING	Important process for making entire circuits in a crystal of silicon by etching, which is resistant to diffusion	U.S.	1956
THERMOCOMPRESSION BONDING	Process technique for attaching wires to semiconductor surfaces	U.S.	1956
PHOTOLITHOGRAPHY	Technique for printing microscopic patterns on surface of semiconductors to form circuits and devices	U.S.	1957
INTEGRATED CIRCUITS	Combining many transistors and other circuit elements —electrically connected— on a single "chip"	U.S.	1958
PLANAR TRANSISTOR	Transistor whose crystal is built up with oxide—the fabrication process provides important new degrees of freedom that circuits	U.S.	1959
EPITAXY	Process for "building" a crystal of one conductive type onto a crystal of another type	U.S.	1960
ION IMPLANTATION	Technique for introducing dopants into a crystal by "bombardment" with ion beams of the elements	U.S.	mid-1960's
LIGHT-EMITTING DIODES (LED's)	Devices that provide light by illumination or spots of light by generating display characters	U.S.	1965
CHARGE-COUPLED DEVICES	Most versatile mass-production fabrication of some circuit functions, e.g., certain imaging and memory functions	U.S.	1970
ELECTRON-BEAM EXPOSURE SYSTEM	Faster, more precise technique for defining patterns for integrated circuits	U.S.	1974

But Lags at Exporting



One ardent advocate of the view that the U.S. exports too much technology is Michael Boretsky, a Commerce Department economist who specializes in international trade. To illustrate his argument, Boretsky chose a field in which U.S. corporations have made nearly every technological breakthrough: semiconductor electronics. The table at left shows that U.S. corporations developed seventeen of eighteen major innovations in this field—twelve of which came from Bell Laboratories. Yet, as the chart above illustrates, the U.S. trade balance in the category of electronic and communications equipment has slid deeply into the red. Boretsky cites this as evidence that the U.S. economy has suffered because corporations have exported their know-how to foreign manufacturers.

Boretsky acknowledges some limitations to his argument. For one thing, the trade-balance chart includes only radios and television sets, radio and TV transmitting, signaling, and detection equipment; telephone and telegraph apparatus, and electronic components and accessories. It excludes one trade category that incorporates semiconductor technology—computers—in which the U.S. enjoys a favorable trade balance. And, of course, foreign manufacturers of electronic and communications equipment have not prospered in the U.S. market solely because they were able to buy U.S. technology. Still, it's clear that for a broad range of electronic products, the U.S. has failed to capture as much of the world market as it should, in view of its laboratory prowess.

APPENDIX I

Reproduced from Fortune, May 1976.

EXHIBIT B

APPLIED SCIENCE IS PURE NONSENSE IN MYOPIC BRITAIN

(The Times Higher Education Supplement 19.3.76)

I have previously argued in The Times(August 29, 1975) that Britain has a tendency to bias debate about cultural issues away from considering the production of useful artifacts and towards the fine arts, knowledge and science.

Lord Clark's book Civilisation illustrates this trend. Although he admits that the useful arts are essential for his idea of the civilized life his treatment implicitly denies this view. The potter and ironmaster are forgotten, even though they are essential supporters of the painter and architect.

Responses and classifications of this type are peculiar to a culture dominated by the English language, and have helped to generate a state of mind in which the useful is devalued in importance. The dreaming towers of the Academy reinforce the view, adopting the bizarre potion of "applied science" which, by the very phrase, implies the seamier side of "pure science".

In other European countries, the classification and implied relative importance of parts of the cultural and sub-cultural jungle look quite different. In Germany, for instance, if the man on the Düsseldorf tram is heard talking of differences between the "two cultures", the assumed split is invariably between Technik--making useful objects--and the rest.

More commonly however there is a three-way separation into Kunst, Wissenschaft and Technik--art, a broader conception of science than our normal one, and manufacture--which form the subject of this article. There are three main points to be made. First, the continental conception banishes a British nonsense, whereby history and sociology, both studies of man in society, can have crept into separate cultural camps.

To the University Grants Committee and to those who think as its system of classification provokes, history (or at least the teaching of it) is part of the "arts"; sociology is part of "social studies". In Germany, in contrast, both are unashamedly part of Wissenschaft, the scientific approach to knowledge. Geography, an "art" subject to the UGC, sensibly becomes a German-style "science".

Second, the K-W-T cultural system reflects a long-existing pattern of separation in higher education in Germany, and in those many countries which have followed Germany. Wissenschaft includes all the topics taught in the classical universities.

Technik in contrast, has generally been taught in Europe in separate technical universities, quite outside the classical universities. Kunst, the fine arts, has been taught in a number of separate schools and conservatories. So each has its cultural shrine; and no one with a university background is a German-style "arts" graduate.

A third point is that,as already implied, Wissenschaft, including all formally expressed knowledge, is quite different from out first meaning of "science", which makes "pure science" much the same as natural science. Indeed in another sense, Wissenschaft denotes a method, the empirical approach to knowledge of all sorts, and is not uniquely connected with natural events.

Any system of classification tends to have its anomalies, especially one which attempts to group together very diverse elements. One in the K-W-T. system is that a piece of creative writing in fiction is included within Kunst: whereas literary criticism is classed as "science" and part of Wissenschaft. So the novels of Jane Austen are found on quite different shelves from their appreciations.

The most obvious difference between the continental and the English-language systems is that the very existence of Technik separates natural science from the useful arts. It also dignifies manufacturing as an aim which is important without reference to the norms of "science" or "art".

The English habit of calling engineers "scientists" is therefore both astounding and meaningless to the typical European. So is the English-language idea of a "science-policy," which tends to include elements of so-called "applied science". Those with Nobel prizes in physics or biology are less likely to be heeded on topics of manufacturing in Germany than in Britain.

To an anthropologist the idea of culture is closely bound up with the skills in the useful arts. Did this particular people know how to fashion metals? Could they cultivate the land? What sort of tools had they developed? Groups and civilizations become known by the useful artifacts which they left behind: Stone Age, Bronze Age, the pottery Neolithic Age.

Given such acknowledgement of a social and cultural preoccupation with the useful, should present societies be classed in a different way? Or has something happened so significantly in cultural development that other main indicators should be used? For it can be argued that increased living standards in the present developed world make it more sensible to think of these cultures differently from more primitive ones, and the ensuing argument can therefore be framed in two alternative ways.

First, assuming that the approach of anthropologists is still applicable, and that there has been no substantial break in cultural development, the English language treatment of cultural and subcultural areas is not only myopic; is it reckless.

It is myopic because it assumes, through its dogged insistence on an "applied science" reading of the process of continental Technik, that

technical change is intimately concerned with changes in the use of knowledge of natural science. Evidence from case studies indicates that this is not the case.

The "applied science" conception is reckless because it assumes quite wrongly, that those who have the boffins also have the power. In truth, possession of scientific knowledge simply does not transmit easily into economic and industrial strength.

The alternative position assumes that there has been a major break in cultural development somewhere, say, between the eighteenth century and today.

What, therefore, makes our English-language cultural analysis so inept, and the European K-W-T system more suitable than ours? The answer again lies with Technik and the ridiculous English-language idea of "applied science" hallowed in UGC usage.

The "applied science" idea is misleading for at least four reasons. It implies, erroneously, that there can be a matched idea known as "pure science". It implies, equally erroneously, that the manufacture of useful products can be characterized as the use of natural science in a practical setting. It degrades a number of important functions in industry. And it misinforms outsiders about these functions.

The idea of purity denotes some sort of measure of applicability or utility in practice. However, there can never be any body of "pure science" in these terms, since all knowledge is potentially applicable and useful, and no one can ever be sure when a particular piece of knowledge is used.

Even the phrase "applied science" is a misleading concept. If it means part of Technik, the manufacture of useful artifacts, it is wrongly named. The one feature common to all scientific work is that its main output takes the form of knowledge; whereas work within Technik has as its goal a product or process.

If "applied science" is meant to describe scientific work undertaken in order to be applied in manufacturing or in other practical situations, it is wrongly named for the reason argued above. There is no contrasting body of "pure science." So all scientific knowledge is "applicable science" and there is no meaningful contrast between "pure" and "applied".

The other three points can be dealt with briefly. First, almost all empirical investigations of industrial innovation (major changes in product or process) indicate that innovation is not typically the result of new use of knowledge derived by natural science.

New artifacts tend to derive directly from older artifacts. The vigour and determination of individuals is usually a more important factor influencing success, than any connection with science. Besides this, general technical change, continuous rather than consisting of discrete steps, is even less influenced by changes within natural science.

The adoption of the "applied science" construct, impossible in the European K-W-T system, is based on a connexion between natural science and manufacturing which does not exist. It therefore distorts the general and lay understanding of the manufacture of useful artifacts. In particular it helps to devalue the assumed importance of production and product design in the manufacturing context.

Thus, even if the Victorians were right about cultural development, we are wrong to neglect the Technik idea and adopt "applied science" instead, purely on the grounds that the latter idea is a nonsense.

In my earlier paper, I mentioned the English recumbent hero. To the intellectual this is a Keynes lying in this bath successfully phoning his stockbroker; to other English people and to most foreigners, an aristocrat with his effortless ease.

A hero of this type is typically someone of great achievement and distinction who has not had to work hard for it. The workshop of effortless ease is a Victorian hangover and longlasting English mirage for prosperity and success. No desert Bedouin ever saw a goal so beguiling, so diverting, and so capable of his total disorientation.

Oxbridge high tables seem to be the shrine for British cultural discussion. Those who live there in the cultural box called "science," by adopting the foolish and inaccurate "applied science" construct, have allowed the average Briton to imagine that he can obtain a form of material salvation by science, rather than by intelligent effort.

In the continental European way of thinking, this is impossible. Neither moonshot nor transistorized communication, nor industrial progress is much concerned with "science." Each is to do with Technik, which the Academy in Britain does not really want to know about.

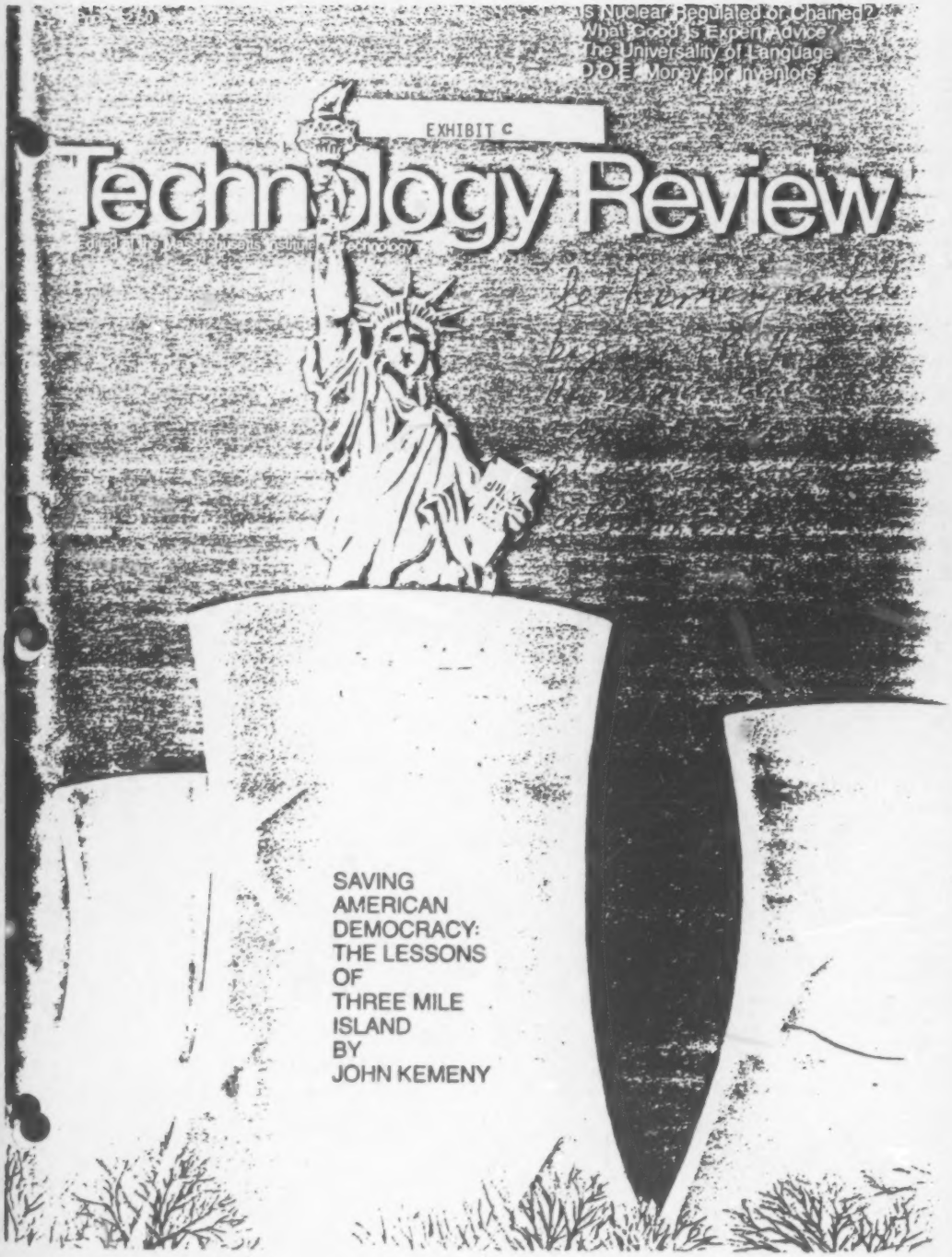
Those in the high table "arts" box have accepted some of the scientists' assumption. To them "art" is superior to "science," since it provides more scope for individual flair and creativity. Nodding to the scientists, the arts man notes that there are two parts to the other side of the gulf. And "pure" provides more of a challenge that "applied": everyone in the Cavendish agrees about that.

It is well known, so the argument goes on that those within the "science" box who are not up to plumbing the great secrets of nature are consigned to detailed problems of nuts and bolts of far lesser importance. Do not shout too loud about it, the "arts' people do on; but Lord Clark is right. Art's product is what man is sensibly most proud of, as it forms the major part of his heritage.

This archetypical English "arts" line of reasoning, neat but misleading, is at the best, and on the second assumption of this paper, a foolish incantation by those who congratulate themselves for having avoided involvement with the drudgery of physics or manufacturing.

At the worst, and on my first assumption, it is the foundation of the slow suicide of a group: a sure way of how not to succeed as a nation without really trying to discover why. Any grasp of the Technik conception would help in this discovery.

MICHAEL FORES


Is Nuclear Regulated or Chained?
What Good Is Expert Advice?
The Universality of Language
D.O.E. Money for Inventors
EXHIBIT C
Technology Review
SAVING
AMERICAN
DEMOCRACY:
THE LESSONS
OF
THREE MILE
ISLAND
BY
JOHN KEMENY

Saving American Democracy: The Lessons of Three Mile Island

by
John G. Kemeny

Two hundred years ago, the founding fathers designed one marvelous political system. It is no longer adequate for the complex issues of today. Government, industry, the media, and the people, therefore, must once again form a more perfect union.

It was one year ago last April — April 11, 1979, to be exact — that my wife and I walked into the Oval Office at the White House. I had never before met the president of the United States, and if anyone had suggested, 48 hours earlier, that I would soon be accepting the chairmanship of a presidential commission, I would have thought that person totally out of his or her mind. But somehow there we were, and it led to six of the most difficult but also most fascinating months of my life. I'd like to tell you a little about the work of that commission and reflect on some serious concerns that I acquired from the experience.

Two weeks earlier, a small and ordinarily unimportant malfunction had occurred at a nuclear power plant in Pennsylvania, and it started a sequence of events that would have repercussions all over the world. As a result, President Carter appointed a commission of 12 citizens who had nothing in common except that they represented the greatest possible diversity the White House could create. We were diverse in our expertise, in our backgrounds, in our traditions, and in our beliefs on nuclear power. You may ask, as the media often did: What governs the selection of a chairperson amid such potential anarchy? My standard response was that ten years of chairing faculty meetings must surely be ideal preparation for such an assignment.

People Problems

[illegible]tunately, we were assisted by an able and ex[illegible]ely hardwor[illegible]ng staff. It was an intense educa[illegible]or all of u[illegible]nd eventually we accumulated a hou[illegible] of evidenc[illegible] all majo[illegible] issues so overwhelm[illegible] this [illegible]nously diverse commission [illegible]ject That, in a way, may [illegible]k of 1979.

[illegible] some of our findings for you. [illegible] four [illegible]er the [illegible] a very [illegible] had

failed to recognize that a certain valve had stuck open, and failure to recognize certain other symptoms led them to turn down the emergency core cooling system. Indeed, there is no question that these omissions converted what should have been a minor incident, that you would never have heard of, into a truly major accident. But I remember vividly, at one of our earliest open hearings, the sworn testimony of these operators, who insisted they'd never been trained for anything of the kind that had confronted them. I didn't believe them at the time, but before we were through, I would learn that they spoke the truth. They in fact had not been prepared.

This convinced us that the training program for operators should be thoroughly investigated. Some of the training, it turns out, is on the job, and some of it is by contract with producers of the equipment. One witness, the head of training for a manufacturer, was very proud of the significant improvements he had made over the past five years or so in his company's program. What was the single most important improvement? we asked him. "When I came," he said, "many of the lectures were given by engineers. But engineers can't talk so that people can understand them. Therefore, the first rule I laid down was that no engineer is allowed to participate in the training of operators."

We were not totally charmed by that answer, especially when we dug deeper and discovered that all theoretical background had essentially been removed from operator training programs. They were trained for button pushing — totally adequate for normal operating conditions — but they really had not been prepared for a serious emergency. It was entirely legal under Nuclear Regulatory Commission requirements, and it became standard practice, that the operators were trained for an accident in which only one thing went wrong. They were never given an exercise where two things independently might go wrong. And in this particular accident, three things independently went wrong. The simulators are perfectly capable of generating such scenarios — before our six months were over, the Three Mile Island simulator was reproducing the accident correctly, although a bit late for the operators' benefit — they simply were not programmed to do so. When one compares that kind of training program with the typical simulator training for airplane pilots, one finds this industry substantially behind.

We were comforted for a while by the fact that many operators had come out of the nuclear navy and therefore had substantial experience. But Admiral Rickover pointed out the implications of the privacy act: unless an employee signs a waiver, the employer does not know whether he or she performed superbly in the navy or got kicked out of it. Since it has not been the industry's practice to have such waivers signed, I am sure those employees must range from the sublime to those who should never have been hired.

A second major area (that became a personal concern because of my background) was the information available to operators in the control room. I shall never forget our visit to the relatively untroubled sister plant at Three Mile Island which, incidentally, was most impressive: the equipment was immense, seemingly well built, and people understood it. Everything was extremely magnificent until we came to the control room, and there I had some rather unusual experiences. When you walked in, you saw a large wall entirely filled with little panels that serve as warnings. I think there were close to a thousand of them, if my memory serves me right, and since a canned lecture about the control room was not telling me much, I simply watched what was going on.

After about five minutes I heard a bell going off. An operator did something while the lecture went right on, so I interrupted the guide and asked him if he would mind telling us what had happened. He said an alarm had sounded, but that an alarm does not necessarily indicate something you should be alarmed about. It simply means the operator should look at something and possibly take some corrective action. Behind each one of the little plastic sheets was a light, he said, and a blinking light told the operator what the problem was. He pushed the right button, the bell stopped ringing, and they took care of the problem.

When people deeply believe that nothing really bad can happen, then clear signals of problems tend to be ignored.

So ten minutes later, when another alarm went off, by this time I was an expert. I spotted the blinking light, the operator went and looked at it and then did the right things, and normalcy resumed. Fifteen minutes later, I heard the alarm sound again and I looked all around and there was no blinking light. I did see the operator scurrying about, and he called over one of his assistants, who then started removing those little plastic parts one by one. I raised my hand again and said, "Sir, would you mind asking the operator what is going on now?" They had a whispered conversation and said, "Oh, it's nothing important. It's just that when you hear an alarm go off but no light is blinking, that means the appropriate light bulb is burned out." Then I watched for ten minutes as they painstakingly removed those little plastic sheets and did indeed find the burned-out light bulb (it was just like an ordinary flashlight bulb). They replaced it, and when it started blinking they knew what was wrong.

Now I'm afraid I got myself into serious trouble afterward because I remarked, within hearing distance of the media, that I did not think this particular control room represented the greatest glory of modern technology. In fact, I said it was at least twenty years out of date. I was greatly criticized for that. And rightly so, because my statement turned out to be false — we later discovered, in the documents of the NRC, a report written ten years earlier in which an expert had said that the control rooms were *then* twenty years out of date.

We started our work with the prior conviction that the big problem was equipment. But our overwhelming conclusion was that the basic equipment was amazingly good; it was the control room that was terribly designed from the point of view of the people who had to use it. The commission's attention slowly but steadily shifted, almost completely, from equipment to people. And we found that this was one of the most horrendous "people problems" we had ever encountered. We found it at three different levels. I have already told you something about the training of operators. We found a similar problem in the attitudes of management, and we found it within the NRC.

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Nothing Can Possibly Go Wrong, Go Wrong, . . .

Nuclear power is an industry that seems to be hypnotized by equipment, and its equipment is darn good, but a fundamental belief persists that you can make equipment totally foolproof. Three Mile Island would seem to have dashed that notion, but when people deeply believe that nothing really bad can happen, then clear signals of problems tend to be ignored. Consider, for example, an incident at an Ohio plant called Davis-Besse in September 1977 that we investigated in considerable depth. It had very strong similarities to what would happen at Three Mile Island a year and a half later. Again, two minor malfunctions: a valve sticking open and the operators turning off the emergency core cooling system. Our big find was an engineer's document in the records of the equipment manufacturer. His report stated that they were extremely lucky the plant had been operating under low power and had recently been refueled, and therefore there wasn't a great deal of residual radiation about. He added that if the incident had occurred under different circumstances, extremely serious core damage would have resulted. His report stated, absolutely correctly, that we must give the operators clear instructions; and he had come up with instructions that would have prevented the Three Mile Island accident. Because of a bureaucratic snarl within that organization, however, the document was kicked around and never got out. A parallel story, involving a relatively low-level inspector within the Nuclear Regulatory Commission, has an ironic ending. He also worried about Davis-Besse, and he talked for months and months, to no avail, until he finally took advantage of something called the "open-door" policy: he went to see two of the commissioners, who took him very seriously and ordered an investigation. But that was March 21, 1979, only one week before Three Mile Island. It was too late.

There are other examples — one in the Tennessee Valley Authority and another in Switzerland, for instance — in which senior engineers predicted operator confusion under various plausible conditions, only to be put off or ignored by management.

We were diverse in our expertise,
in our backgrounds,
in our traditions, and in our beliefs on
nuclear power.

Our unanimous verdict may well
have been the miracle of
1979.

It wasn't any shortage of competent people that caused the inaction; it was the basic attitude that the systems were already foolproof.

Of the three "people problems," I saved the Nuclear Regulatory Commission for last. I have to report to you that the agency, at least the way it was structured a year ago, was a total disaster. It was clearly not part of the solution but a serious part of the problem. It's not that it was negligent in publishing regulations — it published tons and tons of them — but they tended to be of third or fourth order of importance, in our judgment. The really significant and fundamental issues in nuclear power seem to have eluded the NRC. For example, they missed operator training. Their inspection and enforcement arm was one of the weakest. They had the lovely habit of giving some very difficult issues a special "generic" label, thus allowing these issues to sit on the shelf. They also had no systematic way — I mean that absolutely literally and I am repeating sworn testimony by senior NRC officials — they had *no* systematic way of learning from experience. It was an agency convinced that the equipment was so foolproof that nothing bad could possibly happen; they therefore honestly believed that whatever they were doing was sufficient to assure nuclear safety.

It is not surprising, then, that in spite of the diverse backgrounds on our commission, we reached the unanimous conclusion that fundamental changes were necessary, within both the industry and the Nuclear Regulatory Commission, in people and in attitudes, if you are going to prevent future accidents as serious as Three Mile Island. And we came up with a long list of recommendations to try to significantly improve the safety of nuclear plants. At the same time, we also had to conclude that we did not find any problem that was not curable or that led us to the conviction that nuclear power is too dangerous to exist as a viable energy source. Personally, I had no particular opinion on nuclear power, one way or the other, before chairing this commission. I do have an opinion now: if recommendations like those we came up with are implemented during the next few years, I think nuclear power can be one of the energy alternatives available to humanity. I am equally convinced, however, that if recommendations like ours are not implemented — if a year from now it is business as usual — then the nuclear power industry will put itself out of business, a victim of its own attitudes. This is why we recommend a permanent watchdog committee for nuclear power, which I understand will be set up very shortly, so that the American people can know whether these recommendations are being seriously pursued.

Life on the Frontiers of Science

As I watched our own commission struggle through six months of very, very hard work to reach agreement on one small piece of the energy problem — one accident at one nuclear power plant — and as I watched the federal scene, I began to have tremendously serious worries: how will our nation be able to face up to the problems of the immediate future, and how will we ever devise effective solutions to our immensely complex problems?

The 1980s are certain to be a decade of decisions. They will be difficult and they will often be painful. Many of our problems have no simple or pleasant solutions and will require sacrifices from all of us. Certainly energy and inflation are two problems that come immediately to mind, and there are many more. Fundamental changes in the health care system of the United States may lie ahead, for example, and I hope some fundamental changes in our transportation system as well. I recently made a list of such problems to isolate what features they have in common, and I observed six:

- ☐ Any one of these problems is vastly more complex than Three Mile Island. And it was difficult enough — extremely difficult, in fact — for 12 honest, hardworking, and bright individuals to come to a consensus on that.
- ☐ The problems require significant technical input from scientists, engineers, physicians, economists, and many other kinds of experts.
- ☐ The problems cannot be solved piecemeal. You cannot have a little piece here and a little piece there and hope that they will fit together like a jigsaw

puzzle. They require a systems approach — an overall plan.

- These problems must be solved on a national scale. In energy, for example, this nation can no more survive half energy-rich and half energy-poor than it could if half the nation had plenty to eat and the other half were starving.
- Because of the sacrifices that we may be called on to make, plans cannot be implemented without a substantial national consensus.
- Someone will have to make the choices for us among the existing alternatives. That is presumably the role of the president and Congress, but what worries me after my Washington experience is that I do not see an effective process in place for making those decisions.

Let me go into a little more depth on some of these points. Consider technical input, for example. There was a time when if someone asked me for information on science, I'd say, "Go ask a scientist." And if they said, "Which one?" I probably would have replied, "As long as you get a good one it doesn't matter which one, because if the question lies within the scientist's area of expertise and he or she investigates the problem long enough, the scientific truth will be obtained." I still believe that, but it's not always of practical value because some of the technology we use is at the very frontiers of scientific knowledge.

Our commission ran into this problem twice, once in the physical sciences and once in the biological sciences. In the former case, we tried to go through a hypothetical calculation: What if the accident had proceeded further than it actually did and there had been a true meltdown within the system? Would the molten core have been contained or not? We contracted with great national laboratories for the answer, and they did everything they could to find it. Their answer was: We *think* it would have been contained. That is more reassuring than the alternative, but we cannot be absolutely sure because our experts just do not have enough information to answer that question with certainty.

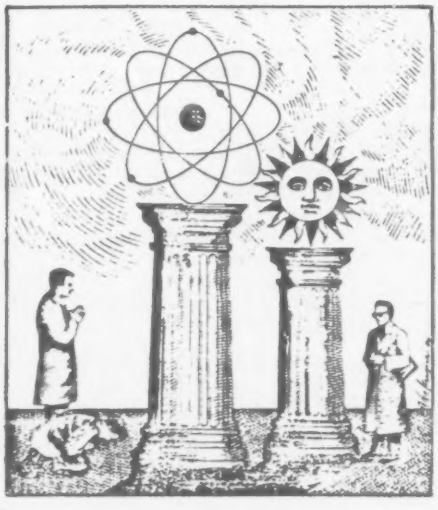
The latter case involved low-level radiation and its effects. Medical science simply does not know all the answers in this field. Fortunately, in this particular accident, such a minute amount of radiation actually got out that it did not matter much, even within a factor of 100, whose estimates on the effects of low-level radiation were correct. We could say that there will be no (or practically no) health effects from this *particular* accident. On the other hand, that problem must still be solved both generally and in the long run.

I keep talking as if the problems could be solved entirely by physical scientists. Of course that's not true. If you're talking about problems that will affect people all over the country and the world, you've got to get more input from social scientists. I have said this for at least 20 years — that the social scientists are unfortunately still lagging behind the needs of the nation. Of course, there is no magical way of getting breakthroughs in the social sciences, but we desperately need some.

In the course of our commission's work, we again and again ran into cases where emotions influenced the judgments of even very distinguished scientists. This was most disturbing to me, and I was reminded of that famous incident when Galileo was forced to recant some of his great discoveries because they ran counter to religious beliefs. Today the problem is not with religion per se, but I kept running into scientists whose beliefs border on the religious and even occasionally on the fanatical. And I hasten to add that I observed this at both extremes of the nuclear debate. These people distort their own scientific judgments and hurt their reputations by stating things with assurance that they know, deep down, could only be assigned small probabilities. They become advocates instead of unbiased advisors. This is incompatible with the fundamental nature of science and it creates an atmosphere in which there is a serious mistrust of experts: even when the hard evidence is overwhelming, if the issue is sufficiently emotional you can always get an expert to dispute it and thereby help throw all of science into national disrepute.

The Media and the Message

But suppose, somehow, we do get scientific consen-



I kept running into scientists whose beliefs border on the religious and even occasionally on the fanatical.

sus. How do we then conduct a significant national debate, at least with those citizens willing to listen and think? It's not possible to do that without getting the issues out to millions of people, and that means the media. Since I'm about to say some very nasty things about the media, let me immediately admit to some notable exceptions. But I underline that they are exceptions and not the rule.

The worst handicap to getting serious issues before the American people is commercial television. Our very distinguished commentators are specialists in describing enormously complex issues in one minute. I've even learned what "in-depth treatment" means: you get a full five minutes, with only two commercial interruptions. Even public TV, which today competes with commercial TV for the same markets, has started using some of these techniques. And while public television still gives better treatment, it also leans toward what will attract audiences and not necessarily toward what is most educational or best for the nation.

So one would hope to do better with newspapers. I had some disillusionment in that area, too, as our investigation proceeded. Only the most responsible papers will print an entire story, and you get it only if you read to the bottom of page 79 (or whatever). If you stop halfway through, you still have read only the headlines and the most sensational part of the story, and you may get a totally biased view of what actually happened. Another problem is the choice of visual images, something our commission got more and more upset about while investigating Three Mile Island. Those cooling towers were featured everywhere as horrible scary towers, and many papers depicted them as sources of radiation. But in that entire plant, the cooling towers are probably the least important features. They are not connected to the nuclear part of the plant, and plain, ordinary, harmless steam comes out of them. But the visual image the papers produced was large and scary, and therefore they became a symbol of Three Mile Island.

When it came to treatment of the presidential commission, most of the national and local media were both fair and kind to us. For some reason or

other they liked us, and I left Washington with a sense of euphoria about how well we had done. It was only after I managed to get some rest and perspective that I began to ask myself, "Okay, given that the media really were on our side, what did the average American learn from us?" I concluded that he or she hasn't the foggiest notion of most of our findings. One or two of our recommendations made headlines because they were what media spokespeople call "sexy." Most Americans have never heard of the rest of our recommendations, and most are totally unaware that the president accepted essentially all of them.

The last event is a good object lesson on what happens in covering a story. I happened to be in the middle of it because the president was kind enough to send a messenger that morning to my office in Hanover, New Hampshire so that I'd be among the first to know the official response, point by point, to our 44 recommendations: 38 were accepted outright, 5 were accepted in modified form (probably because Congress wouldn't have passed them in the original form), and 1 relatively small recommendation was rejected as not practical. I was delighted and looking forward to the stories in the papers. But the president did one more thing that day: he replaced the head of the Nuclear Regulatory Commission. Now that is the *least* important thing he did that day — it was a symbolic move. But the major media obviously thought, "This is the big story," and there were huge headlines about the changing of the guard. They again were kind to me, with several papers featuring my statement of delight quite prominently, but unless you read to the bottom of page 79, you never discovered what it was that I was delighted about.

I saved for last what troubles me most about the media: their treatment of scientific subjects. They love controversy. And that is probably good for the American people when it is a question of political elections, when it's a matter of covering Democrats and Republicans or liberals and conservatives and giving them equal space. But this produces a strange effect when reporting scientific stories, because the two sides to every scientific "controversy" do not necessarily deserve equal space. I left Washington fully expecting to read the following story someday in one of our morning papers: "Three scientists by the names of Galileo, Newton, and Einstein have concluded that the earth is round. However, the *New York Times* has learned authoritatively that Professor John Doe has conclusive evidence that the earth is flat." And then the article will go on, perfectly unbiased, giving equal space to both sides of the issue. This is a caricature, of course, but I saw such extreme examples, again and again on both sides of the nuclear debate, that I don't blame the American people for being totally confused. With that kind of reporting, the reader is left with the feeling that you can't trust scientists because they obviously can't agree amongst themselves.

A Modern Democracy in America

But suppose we get past that and we do get a national consensus. Someone then has to choose a plan for energy, for transportation, for health care, for inflation, for whatever the issue may be.

At the moment I do not see the machinery for achieving this, and I emphasize that my observation is strictly nonpartisan — the problem is with the basic system. Perhaps my view is unduly influenced by the Nuclear Regulatory Commission, but even if the NRC isn't typical of federal agencies, the executive branch has certainly grown more and more uncoordinated over recent decades. It is gigantic, it is splintered, and it is full of jealousies among agencies when we desperately need cooperation.

Consider the response of the executive branch to the accident at Three Mile Island. It was so disorganized during the emergency that the White House had to step in and knock heads so that the different agencies could work together. Four weeks after the accident, at our first public hearing, senior officers from three major branches of the executive testified that they did not go out and measure radiation until two and a half days after the accident. Here we were, a brand-new commission confronting one of our most important charges — to estimate the health effects of the accident — and we were terrified that

the crucial information had been lost. I went to sleep greatly worried. The next morning, a representative of the Department of Energy by the name of John Deutch [professor of chemistry at M.I.T., then on leave] testified about DOE helicopters going in and measuring radiation. I interrupted, "Would you mind telling us when you started taking those measurements?" And he said, "I'm sorry, I don't have my notes here on that. It could have been 12:30 or 1:00 o'clock." I said, "Sir, the question isn't at which hour, but which day?" And he answered, "Why, of course, the day of the accident. We were there within hours of the accident." And indeed, DOE produced all the data we needed to make our estimate. The point I am trying to make is: four weeks after the accident, the other three major branches of the executive that participated still had not discovered that DOE had this crucial information. So I worry greatly about whether we have a system to pull experts together from many different fields and come up with integrated plans.

I am much more worried, however, about Congress. We received a most sympathetic hearing with senators and representatives, but generally they were poorly briefed and there was no time for in-depth discussion. I do realize, of course, that the issue of Three Mile Island — overwhelming in our minds at that moment — was for them but one of a hundred issues. Members of Congress generally have a small, young, and inexperienced staff, and they certainly cannot be experts on all hundred issues. Representatives, moreover, are continually running for reelection — an enormous drain on their energy. But beyond all that, I had the impression that Congress has particular difficulty coming to grips with issues that involve significant input from science and technology. They cannot possibly be experts (not the way they are elected), but they seem to be confused even on the *use* of experts. I recall distinguished physicists on the commission being asked not about physics at all but to make a pure value judgment, when I thought that we elect senators and representatives to make value judgements on our behalf. At ame time, some of them very freely expressed ng opinions on scientific fact. I thought that is

The executive branch is gigantic, splintered, and full of jealousies among agencies when we desperately need cooperation.

Suppose Congress designed an airplane, with each committee responsible for one component. Would you fly on that airplane? Yet we are flying on just such an energy plan.

what we have scientists for. Indeed, I had a horrible nightmare one night in Washington: the House of Representatives, by a vote of 215 to 197, had repealed Newton's law of gravitation!

My conclusion is this: I've heard many times that although democracy is an imperfect system, we somehow always muddle through. The message I want to give you, after long and hard reflection, is that I'm very much afraid it is no longer possible to muddle through. The issues we deal with do not lend themselves to that kind of treatment. Therefore, I conclude that our democracy must grow up. I'm not going to give you a magic recipe on how that will happen — I wish I had one — but I offer some thoughts that I hope will stimulate your thinking.

What's principally lacking on the federal scene, it seems to me, is the existence of respected, nonpartisan, interdisciplinary teams that could at least tell us what is possible and something about the pluses and minuses of different solutions. Take energy, for instance. What I would love to see established, with the National Academies or any other mechanism to confer respectability, is a team that will struggle the way our commission did and say, "Okay, there are lots of suggestions around, and most of them won't work. But here are six different plans, any one of which is possible. We'll tell you what each one costs, what's good about it, what's bad about it, how dangerous it is, and what its uncertainties are." At least each option would be a well-integrated, clearly thought-out plan. I would trust democracy — the president and Congress — to choose among them; but I do not trust democracy to try to put together such a plan by having each committee of Congress choose one piece of it. And if you have any doubts, think about this for a moment: Suppose Congress designed an airplane, with each committee designing one component of it and an eleventh-hour conference committee deciding how the various pieces should be put together. Would you fly on that airplane? I am telling you that we are flying on an energy plan, an inflation plan, and so on that are being put together in exactly that way.

Not unnaturally, I want to put in a plug for the role of universities, which used to play a much more important role in long-term research and in worrying about the problems of the nation. Of course, a huge cutback in spending on pure research came about under the Nixon administration. We never recovered from that, and I think it is vital that this should be restored, because some of the desperately needed brain power is spread out among the universities and we are losing a vital resource. Another role for the universities, especially seeing the difficulty today's leaders have in grappling with our national problems, is to educate the next generation of leaders so that they can directly understand and come to grips with the monumental issues of our time.

With regard to the media, I'd like to suggest that they hire some people who know something about science and technology. I would even like to go one step beyond that and make a more radical suggestion: once they hire them, allow them to speak for themselves and not through the mouths of others. There seems to be a general belief — particularly on television, but also in some of the print media — that after a scientist or engineer has been interviewed, professional writers or actors (in effect) will report it so that people can understand it. Now I'm not saying that all scientists or engineers could go out there and talk so that most people knew what they were talking about, but certainly a lot of them could do at least as good a job as those who are doing it now. There would be fewer large mistakes, and less would be lost in "translation" to the American public.

I certainly advocate some reform in the electoral process, particularly in the terms of representatives (say, from two years to four years) so they won't be continually running for office. I also suspect that something like a six-year nonrenewable term for the president might be very good. I'm not saying anything that's especially original, nor am I offering any magical numbers, but anything that would help to liberate our office holders, once elected, from the electoral process would allow them to direct more of their time and energy to the nation's problems.

My last point, and the most important one, is for our nation to recognize that the present system does not work. It was designed for a much earlier and

simpler age. Even 200 years ago, the founding fathers made choices. They opted for democracy, but they did not opt for Athenean democracy. It would have been totally impractical to use an antiquated model that called citizens into the marketplace to vote on every issue as it occurred. And yet today we have essentially the same system, now itself outmoded, that we had 200 years ago. It is time to rethink the issue, because I believe that Jeffersonian democracy cannot work in the year 1980 — the world has become too complex. I'm not advocating the abolition of democracy. What I *am* advocating is its salvation. And the only way to save American democracy is to change the fundamental decision-making process, at the federal level, so that it can come to grips with the enormous and complex issues that face this nation.

John G. Kemeny is president of Dartmouth College. He served as chairman of its Department of Mathematics from 1954 to 1966, and is well known for his pioneering work in computer time-sharing for educational purposes. President Kemeny received his Ph.D. in mathematics from Princeton in 1949, where he then taught before coming to Dartmouth. During World War II, while still in his teens, he was assigned by the Army to serve as a mathematician on the Manhattan Project, later becoming a research assistant to Albert Einstein. He is the author of more than a dozen books, including *A Philosopher Looks at Science* and *Man and the Computer*.

This article is adapted from his recent Karl Taylor Compton Lecture at M.I.T., "Chairing a Presidential Commission: Reflections."

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APPENDIX D January 21, 1982

THE NATIONAL PROFESSIONS FOUNDATION CONGRESSIONAL SUPPORT

Dec. 1971 - Senator Hubert Humphrey - Speech before the U.S. Congress

Dec. 1971 - Senator John Tunney - Letter of endorsement

Nov. 1972 - Congressman George E. Brown, Jr. - Letter of endorsement

May 1973 - Congressman James C. Corman - Letter of endorsement

May 1973 - Congressman Morris K. Udall - Letter of endorsement

Sept. 1973 - Congressman Guy Vander Jagt - Letter of endorsement

Sept. 1973 - Congressman Garry Brown - Letter of endorsement

Sept. 1973 - Congressman Marvin L. Esch - Letter of endorsement

Nov. 1973 - Congressman John Joseph Moakley - Letter of endorsement

Dec. 1973 - Congressman James A. Burke - Letter of endorsement

Dec. 1973 - Congressman Michael J. Harrington - Letter of endorsement

June 1974 - Congressman Thomas M. Rees - Letter of endorsement

Jan. 1975 - Congressman John J. McFall - Letter of endorsement

June 1980 - Congressman William M. Brodhead - Letter offering to co-sponsor National Professions and Technology Foundation legislation

Nov. 1980 - Congressman Augustus Hawkins

Jan. 1981 - Congressman Anthony C. Beilenson - Letter offering to co-sponsor NPF legislation

June 1981 - Congressman Merv Dymally - Co-sponsor of HR 3817

BILLS INTRODUCED

May 1973 - H.R. 7998: The National Professions Foundation Act - Mr. Chamberlin, Mr. Brown, Mr. Esch and Mr. Vander Jagt

July 1973 - H.R. 9208: The National Professions Foundation Act - Mr. Brown and Mr. Corman

Nov. 1975 - H.R. 10701: The National Professions Foundation Act - Mr. Brademas, Mr. Brown and Mr. Corman

March 1979 - H.R. 3331: The National Professions Foundation Act - Mr. Brown

June 1981 - H.R. 3817: The National Professions Foundation Act - Mr. Brown and Mr. Dymally

PROFESSIONAL ORGANIZATIONS ON RECORD SUPPORTING

THE NATIONAL PROFESSIONS FOUNDATION

July 1970 - Resolution passed by the Executive Committee of the Council on Social Work Education

Feb. 1971 - Resolution passed by the Executive Committee of the California Society of Professional Engineers

June 1971 - Resolution passed by the National Board of Directors of the National Association of Social Workers

Nov. 1971 - Resolution passed by the Executive Committee of the Adult Education Association of America

Jan. 1972 - Resolution endorsed by the Board of the Wisconsin Society of Professional Engineers

Jan. 1972 - Resolution passed by the National Board of Directors of the National Society of Professional Engineers

Feb. 1972 - Resolution passed by the Executive Board of the Association of American Library Schools

[illegible] 1972 - Resolution passed by the Fellows of the Institute of Continuing Professional Education

May 1972 - Resolution passed by the Board of Trustees of the Los Angeles County Bar Association

Dec. 1972 - Resolution passed by the Executive Committee of the American Association of Theological Schools

Jan. 1973 - Resolution passed by the Board of Directors of the American Association of Collegiate Schools of Business

May 1973 - Association of Schools of Allied Health Professions

Mar. 1974 - Endorsed by the Executive Committee of the Board of Directors of the American Society of Civil Engineers

May 1976 - Endorsed by American Council on Pharmaceutical Education

Mr. DYMALLY. Thank you very much. We have some questions, but we want to hear the other panelists, so would you stay with us, and we will come back to you.

Mr. WYNNE. Chairman Walgren, Congressman Dymally, on behalf of the officers and members of the Industrial Designers Society, let me say that, first of all, we are very pleased to have this opportunity to testify on this bill. We support it and will do all we can to cooperate in seeing its enactment.

Mr. DYMALLY. Thank you.

Mr. WYNNE. We have heard the word "design" used in a number of different contexts today, and they are all valid. The unifying element in all references to design is that design is a process. There are different kinds of design. There is engineering design, architectural design, urban design, interior design, and industrial design, I noticed with interest that the statement which was prepared on behalf of Secretary Baldrige spoke very highly of industrial design in the context of the U.S. Design Council. So, taking our cue from Secretary Baldrige, that is the element which we will address.

Specifically, industrial designers are individuals who create and develop concepts and specifications that will optimize the function, the value, and the appearance of manufactured products and systems.

Where the industrial designer fits in, in a unique contribution, is that he or she will balance a concern for marketing opportunities, technical processes, and manufacturing and economic requirements with user needs, wants, and characteristics. The key word there is "user." What the industrial designer does, in the product development team is generate ideas and apply them to human beings. If human beings are not going to use a product, they are not going to buy it no matter how great the technology is. As a result of the industrial designer's contribution, products solve human problems and are more competitive.

In our awards program we list five criteria for what is outstanding industrial design. The first is innovation. Second, the product must appropriately use materials and processes. Third, it must provide benefits to the manufacturer. The manufacturer is not going to produce a product which he cannot sell and make a profit on.

Fourth, it must provide benefits to the user in terms of ease of use, safety, ease of maintenance, and meeting a human need. If the user does not feel that it is applicable to his or her particular circumstance, he is not going to purchase it. Finally, design, as has been mentioned by some others here, must look good. Appearance is an important part of design, but it is not the be-all and end-all.

Our organization provides industrial designers with professional development opportunities and publications, including a copy of our newest journal, "Innovation," which I will be glad to provide to you if you would like.

We accredit undergraduate degree programs in industrial design including three here in the Los Angeles area, Cal State at Long Beach, Cal State at Northridge, and the Art Center College of Design. In Chairman Walgren's neighborhood, we also accredit the Carnegie-Mellon University's department of industrial design.

As an aside, I might add that if either of you gentlemen would ever like a tour of these institutions to see what industrial design education is all about, we would be more than pleased to assist in seeing that happen.

We also represent the U.S. design community before the International Council of Societies of Industrial Design. Mr. Feldman mentioned this group earlier. It consists primarily of two types of organizations: Professional industrial design organizations, similar to IDSA, and industrial design promotion councils which are part of Government agencies.

We are the only major industrialized country which is represented in ICSID only by a professional design society. Mr. Feldman mentioned that there is a world congress and that a very successful one was held in Japan. They have also been held in Finland, in Ireland, and in Mexico, and the next one will be in Italy. In each instance, the government has been the prime backer of that congress. Now, we for the first time, the U.S. industrial design community will be hosting the 1985 Congress of this organization. It will bring the top industrial designers throughout the world to the United States. IDSA will be the only organization which has accomplished this without any government support.

Our profession determines product excellence and quality for manufactured goods representing 25 percent of our national income. According to the U.S. Department of Commerce, income derived from all manufactured goods totaled $510 billion in 1979.

There are fewer than 10,000 practicing industrial designers in America today. The figure is actually closer to 7,000. The average income influenced by each industrial designer is approximately $51 million. We would contrast that to an architect, for example, who influences approximately $1.6 billion in contract construction based on the 1979 figures.

We have heard the recitation of our Nation's economic difficulties. One would think that a group of people who, on the average, influence $51 million of national income would have an important role in the development of America's economy. Yet, we see little attention and, in fact, great ignorance within the business community about the role of industrial design. I will get to the reasons for that later.

Our Nation is the only major industrialized nation in the world which does not have an industrial design promotion agency. I have listed in the prepared testimony, based on a 1980 survey of design conducted by the Japan Industrial Design Promotion Organization, a catalog of countries which have these design agencies and the year of their founding. You will notice there is quite a number, including Third World nations, the major Western powers, plus the Communist bloc.

I will discuss a little history of JIDPO, which we think is probably the best example for our particular instance.

We will recall, as was said, that in the 1950's, "Made in Japan" signified cheap, imitation merchandise. In 1959, Japan made a very conscious decision that low wages and low costs for imitation merchandise would not abet their long-term economic growth, emphasis on the word "long-term."

They brought over at that time American industrial designers who advised them, including some very famous names with whom you might be familiar: Henry Dreyfus, Raymond Lowie, and Jay Doblin. As a result, MITI formed the JIDPO in approximately 1960.

One of the things that JIDPO did was not to approach the industrial design program as a haphazard effort. They had a long-term plan based on long-term benefits and set about accomplishing it in a very methodical and deliberate fashion. Their first priority was to develop their own design training and educational system. They did this by sending the first generation of Japanese industrial designers to American industrial design schools. They learned about industrial design from our educators, adapted our curriculum and brought it back to Japan where they adapted it for their own particular use. This was all accomplished with the support of JIDPO.

The second priority of JIDPO did was to provide technical support for industrial designers. By technical support I mean basically information. Japan was able to put together an immense amount of information which the Japanese industrial design community could use to construct and design their products so that these would meet the user needs, characteristics, and wants of their potential markets, particularly in the international community.

They then went about educating business about the important role of industrial design. Finally, after all of these objectives had been achieved, they began their promotion of Japanese industrial design.

The action which provided an international marketing edge to Japan, and was their research cultural preferences, design standards, human physical characteristics. They have a tremendous data bank in Japan on these items. They know what the user wants and are willing to provide it to them. They will adapt most any technology in order to meet a user want. They are able to export products in part because they know better than we what our people want. The car industry is the best example that I can give.

The contribution of industrial design is also very well recognized in Japan. If you talk to a Japanese businessman, he will tell you what industrial design is and the role that it has had in their economic growth.

The Third World countries use the Japanese experience as a model. Hong Kong, the Philippines, Korea, and Thailand have adapted the Japanese experience. Korea, for example, is the only design promotion organization we know of that has a budget larger than JIDPO. I think the Koreans' is a little over $2 million as opposed to the $1.8 million given by Japan.

In the eastern bloc nations, design is seen as an absolute prerequisite to trade expansion, an absolute prerequisite. If you look at their approach they are trying to attack the western European markets through industrial design. In part because of their reputation for soon product quality.

In about 1962, they began their own effort to reverse this trend. As is mentioned in the text, in East Germany, the head of their industrial design council has cabinet rank in the government. It is a very powerful instrument in the eastern European trade bloc.

The trend is clear. I will not repeat what others have said, but we must recognize that improved competitive position in the world

markets requires that we pay attention to industrial design factors such as innovation, performance, and user satisfaction.

We as an organization support the broad goals and objectives of H.R. 3839. We would like to suggest, however, that perhaps the focus be narrowed a bit, be directed toward, specifically, providing support for the improved training and education of industrial designers. As background, most industrial design programs were originally developed within art departments in universities. If you are familiar with university politics, you will know that those who are in a department in which they really do not control their own destiny—industrial design is a very good example—are often at the whim of the powers that be within the department. So, for example, we will take industrial design in a program of art, where the powers are located in painting and sculpture. You will find that industrial design, which has a very high enrollment rate at the present time (in answering Congressman Dymally's prior question, approximately 50 percent of the enrollees are women and approximately 15 percent are from minority groups at the present time).

Now, we have no problem with art programs, and appreciate their importance in our world. But, we feel very strongly that industrial design programs cannot be the "poor brother" of other programs. They need special attention in order to get quality students, to get the facilities which are needed, and to get the top people as educators. It is a very important issue in the industrial design community at the present time. It is something which has been addressed in Japan, but we in the United States have not been able to address it.

Attention should be directed to the provision of technical support and research data for industrial designers. Also we feel the attention of the bill should be directed toward the education of the business community, particularly MBA schools, entrepreneurs, and small businesses, as to the contribution of industrial design.

We do not know of an MBA program in the United States which requires a course in industrial design. You might recall, a few years back, Mr. Bok, who at the time was president of Harvard University, gave a commencement address at which he spoke somewhat disparagingly of his own MBA program at Harvard for avoiding certain issues. One of them being ethics, but one specifically being design. That issue has still not been rectified at Harvard, nor has it at any business school that we are aware of.

This is very important, because the people who are making these decisions in terms of economic growth, particularly at the small business level, are being graduated from these MBA programs. If they do not know what industrial design can do for their corporation in their long-term business plans, the tendency is going to be to concentrate on the financial operating ratios. These are very important but basically try to insure short-term profits. That is not, we feel, in our country's long-term best interest.

Finally, the promotion in foreign markets of the design excellence of American-made products should be a focus of the bill. Now, it has been stated earlier here today that many design councils engage very heavily in sales promotion efforts. This is true.

We, however, would like to suggest that this not be the primary focus of any design council. Those countries which have invested

the greater part of their budget into the sales promotion effort have done so to the detriment of product innovation.

The Museum of Modern Art was mentioned as an example of a body which had promoted design through their collection. Well, within the industrial design community, the Museum of Modern Art seal of approval, so to speak, is known as a kiss of death for sales. It is excellent art, but not necessarily very successful in promoting sales.

The British Design Council has trended toward the sales promotion effort. We know the economic situation in Britain. France, also, has had the same problem at the Pompidou Center.

So, we would like to suggest very strongly that the emphasis of the Council be placed on the innovation, the training, the research. Only after these objectives have been achieved, should we get involved in the promotion of American-made products. We would suggest very strongly that this promotion be directed abroad, because it is the other nations which have to understand the design excellence of American-made products. That is where our future is if we are to become a producing and not a consuming nation.

We urge that the bill be reworded in some way to state that the Council's primary purpose is to promote and support the use of industrial design so as to accelerate our long-term economic growth and improve our competitive position in world markets. We feel that the bill is fine as it goes but that perhaps at this point in time it is a little too broad in its approach. Because of the budget considerations in the Government, we feel targeting the money—$1 million or whatever might be the budget—should be toward the areas of the greatest need.

We would request that any programs undertaken by the Council should only be in direct support of this specific objective. One of the problems in bodies where there are 15 people brought together is, that without specific goals and objectives to lead them, the tendency to get involved in pet projects and activities which provide short-term, promotional capabilities for the group.

The Council should be involved in the long-term, economic growth of our Nation. Otherwise, we really do not feel that it is worth the money which would be invested by the taxpayers.

It is very important that the taxpayers reap a tangible return for their investment in this Council in the form of a healthy economy, a more favorable balance of trade, and, specifically, more jobs for American workers.

Industrial design, as I mentioned, is a business discipline. Unless it promotes business and provides jobs for American workers, there are bodies other than a design council which can provide services, such as exhibits of American products. The Government, we feel, should be very strongly involved in creating jobs and promoting a healthy economy.

With those suggestions, we would like to reiterate that we do support the goals and objectives of the bill. We are very pleased that you are holding these hearings, and would be more than willing to support your efforts in any way which we can.

Thank you very much.

Mr. DYMALLY. Thank you, Mr. Wynne.

[Mr. Wynne's full prepared statement follows:]

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Testimony on

H.R. 3939

prepared for the

Subcommittee on Science, Research and Technology

by the

Industrial Designers Society of America

Brian J. Wynne, Executive Director

January 21, 1982

94-956 O - 82 - 7

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On behalf of the officers and members of the Industrial Designers Society of America (IDSA) let me state upfront that we strongly support the creation of a U.S. Design Council within the Department of Commerce, and welcome the opportunity to testify before this Committee.

IDSA is the national, professional organization of individuals who create and develop concepts and specifications that optimize the function, value and appearance of manufactured products and systems. The industrial designer's unique contribution lies in balancing a concern for marketing opportunities, technical processes and manufacturing and economic requirements with user needs, wants and characteristics. As a result of the industrial designer's contribution, products help solve human problems and are more competitive, bringing benefits to both the manufacturer and the user.

IDSA provides industrial designers with professional development opportunities and publications, and promotes industrial design excellence. It accredits undergraduate degree programs in industrial design, including 3 in the Los Angeles area -- Cal State at Long Beach, Cal State at Northridge, and the Art Center College of Design. Among other services, it represents the U.S. industrial design community in international forums.

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Our profession determines product excellence and quality (as represented by ease of use, safety, ease of maintenance, marketability, materials, human factors, form, color, function and texture) for manufactured goods representing 25% of our national income. According to the U.S. Department of Commerce, income derived from all manufactured goods totaled $510.4 billion in 1979. With fewer than 10,000 practicing industrial designers in America today, the average income influenced by each industrial designer is approximately $51 million! By comparison, income derived from all contract construction in 1979 totaled $100 billion. This translates into only a $1.6 million contribution per architect in the nation.

Given our nation's recent economic difficulties, one would expect that top-priority attention would be given a professional service in which the average practitioner influences $51 million worth of products. Yet, widespread ignorance of industrial design's vital contribution to economic health and vitality persists in the United States.

The United States is the only major industrial nation in the world which does not have a federally-sponsored "Design Council." Examples of such agencies abound, according to the 1980 International Survey of Design conducted by Japan's design council, the Japan Industrial Design Promotion Organization (JIDPO):

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Country	Year Founded
Argentina	1972
Australia	1958
Austria	1958
Belgium	1964
Bulgaria	1965
Canada	1961
Chad	1976
Columbia	1966
Czechoslovakia	1972
Finland	1911
France	1969
East Germany	1972
West Germany	1962
Hong Kong	1968
Hungary	1977
India	1961
Ireland	1976
Israel	1963
Italy	1962
Japan	1960
Korea	1970
Mexico	1973
Norway	1974
Pakistan	1974
Philippines	1973
Poland	1973
Rumania	1972
Senegal	1975
South Africa	1966
Spain	1973
Sweden	1964
Thailand	1969
United Kingdom	1944
Soviet Union	1962
Yugoslavia	1954.

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The history of JIDPO, in fact, illustrates how a properly functioning agency can assist both large and small businesses to achieve competitive market advantages through industrial design.

If we recall the 1950's, the words MADE IN JAPAN were synonymous with cheap, imitation merchandise. In 1959 Japan made the conscious decision that long-term economic growth required an abrupt change in government policy. American industrial designers were brought to Japan to discuss the role design could play in new product development and long-term growth. As a result, MITI (the Japanese equivalent of our Department of Commerce) formed JIDPO in 1960.

JIDPO's first objective was to develop its own design training and educational system by absorbing the know-how of advanced industrial nations, and adapting it. Industrial design school programs in the United States trained this first generation of Japanese designers who were supported by JIDPO. American design curriculum requirements and techniques were adapted and instituted at newly established colleges and universities with JIDPO's financial support.

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From there, JIDPO expanded its program to include: technical support for industrial designers; the education of business about the importance of industrial design; and a program for design promotion. It also took an action that was to provide Japanese business with an international marketing edge: it compiled research data on cultural preferences, on design standards and on human physical characteristics and other user needs and preferences for every target market in the world.

Today, the contribution of industrial design to their astounding economic success is well-appreciated by the Japanese. The words MADE IN JAPAN now stand for the best in product quality and design throughout the world.

Countries such as Hong Kong, the Philippines, Korea and Thailand have adapted the Japanese experience with a great deal of success, and developing countries throughout the world are using Japan and JIDPO as a model.

In the eastern bloc nations, design is now seen as a prerequisite to trade expansion. The head of East Germany's Design Council, for example, holds cabinet rank in the government.

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The trend is clear. We in the United States must recognize that an improved competitive position in world markets requires attention to key industrial design factors such as innovation, performance and user satisfaction. IDSA supports the broad goals and objectives of H.R. 3839. It strongly urges the Committee, however, to direct that priority attention be given to:

* support for the improved training and education of industrial designers;

* the provision of technical support and research data for industrial designers;

* the education of the business community (particularly MBA schools, entrepreneurs and small business) as to the contribution of industrial design; and

* the promotion in foreign markets of the design excellence of American-made products.

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IDSA urges that the bill be reworded to state that the Council's primary purpose is to promote and support the use of industrial design so as to accelerate our long-term economic growth and improve our competitive position in world markets. Further, any programs undertaken by the Council should only occur in direct support of this specific objective. We urge this statement based on our experience in the international design community and on the experiences of other industrial design councils.

With this stated purpose, the taxpayers will reap a tangible return for their investment in the form of a more healthy economy, a more favorable balance of trade and more jobs for American workers.

We commend Representative Dymally and Chairman Walgren for their foresight in holding these hearings, and pledge our cooperation to the Committee on Science and Technology in any way which would further the goals and objectives we all share.

Mr. DYMALLY. Would you please get in touch with Dr. Maxwell at some subsequent time when we get back to warm Washington, D.C., to discuss some of your recommendations for amendment?

Mr. WYNNE. Yes, we would be delighted.

Mr. DYMALLY. Thank you.

We will come back to you for some questions.

Mr. Hirsch, please.

Mr. HIRSCH. Gentlemen, thank you for letting me have this opportunity to say a few words. I will try not to repeat some of the things that have been stated already.

My field is in hotel design, my working field, where I deal around the world with products, with people, and have the opportunity to see and visit the commercial marketplaces. I wonder, as I travel around the world, what America is really doing. We seem to have become disinterested and uninvolved. We seem to lack the enthusiasm and desire to participate in the production of goods that will compete with those of other countries.

For example, in Hong Kong, which is the shopping center of the Orient, America is conspicuous by the absence of its products. True, a lot of the products that are shown and available are the results of U.S. technology, but "Made in America" does not seem to appear.

This picture is repeated all over the world in major commercial centers including America itself, where our shelves are stocked with imported merchandise, no longer the tinny "made in Japan" kind of product, but quality, well made, well designed and products made with pride and with craftsmanship, not only in our shops—cars on our roads, equipment in our factories, furnishings in our houses, and utensils and appliances in our kitchens.

It is beyond me to evaluate the economic factors, many of which have been stated by Professor Rosenstein, but it is obvious that, from a competitive point of view, we are not competing and someone else is doing the business, someone else is making the profits, and someone else keeps their people employed.

The economic factors are certainly important, especially in our affluent society where our high standards of living are admirable, but they are in jeopardy. I do not know if it is a matter of not wanting to improve or it is a matter of not knowing how. I hardly think so because we have gone to the moon and we can find a way to do anything.

The idea of a national character, as Professor Rosenstein mentioned a minute ago, true, in Japan is something that maybe has evolved recently, but there is a cultural base, and I think that this is one of the problems that personally interests me, and somehow, through the development of this committee, should be addressed.

Japan has an 800-year culture. Italy has thousands of years of culture. Design emanates from these countries and just oozes out, not that America cannot design, but it is the nature and the character of the people, I believe, that has to be addressed. The refinement of American technology appears to be done so much better in Italy, in Japan. Mr. Wynne may take exception, but I do not think

it is the fault of the industrial designer. I think it is the fault of the user, the public, which is where a lot of the education has to start, or it has to be addressed.

So I do believe that there is a matter of cultivating the market here in America to develop products that will be respected around the world. We have gone a long way from the immigrant society of 100 years ago where craftsmanship was a matter of pride. We are not concerned about it. We buy products; we throw them away. We buy more products; we throw them away. We build buildings; we throw them away. So this is a part of the problem and not only in the economic factors, not only in the educational factors, but it has to be addressed.

Our workers are overwhelmed by technology. If we want 200 rooms of furniture, I could just call someone and I could have it in one day. I mean, they push a button and they manufacture it in one day. Five thousand yards of carpet you want? You can get it in a day. I guess a lot of this applies to what Professor Rosenstein was talking about. I believe it was Professor Rosenstein who talked about the robot society. We have to prepare for it, and we have to prepare our society for it, and the American people.

Our society is developing its taste level at a growing rate. It is growing. I can tell in my own field of hotel design where the roadside inn is a thing of the past. We have gone through the Holiday Inn phase. We are into more affluent high rise commercial hotels and luxurious hotels. But now, the developers are looking into the small European-style hotel, not the American-style hotel, the small European hotel because they feel that is what the American public wants.

The problem is what we are not doing and how we are not doing it. The word "design" is very broad. It touches all of our lives in so many ways. It makes us feel good. It helps us to live better lives.

I believe that through a proper study of the uses of good design in our lives, our society will improve and business will follow. We have the tools. We have the educational base. We have the designers. I think we have a lot of the designers in this country, and I think that they need to have the manufacturers listen to them more closely. I know of many designers who design products over and over again, but the manufacturers wind up throwing them in the wastebasket because they feel that the American public is not ready for them, and so we design down to people instead of up, and I believe that is a trend that should be addressed also by this Council.

We have, as I say, the educational base, the designers, the motivated people. We have the facilities, we have the financial wherewithal, but we need the vehicle to tie it all together and stimulate its activity. I believe that, properly developed, a U.S. Design Office as presented in House bill 3839 is an important and essential step for America to assert itself in the worldwide marketplace.

Thank you.

[The prepared statement of Mr. Hirsch follows:]

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ON SCIENCE, RESEARCH AND TECHNOLOGY

ON

HR 3839

A BILL TO ESTABLISH A UNITED STATES
DESIGN COUNCIL

JANUARY 21, 1982
LOS ANGELES, CALIFORNIA

Testimony of Howard Hirsch
Los Angeles Field Hearing on H.R. 3839
January 21, 1982

In the worldwide market place what is America really doing? We seem to have become disinterested and uninvolved. We seem to lack enthusiasm and desire to participate in the production of goods that will compete with those of other countries.

For example... in Hong Kong, which is the shopping center of the Orient, a free trading community for millions of people, America is conspicuous by the absence of the product of its industry. You will find goods from all over the world, i.e., watches from Switzerland and Japan; cameras from Japan, Singapore, Taiwan, and Germany; perfumes and clothing from Italy and France; furniture from Denmark, Italy, and Germany; appliances from all over Europe; cars from Japan and England; textiles? yes, but not of high quality.

True, many of these products find their roots in U.S. technology, but we don't seem to produce goods that will compete. And yet we need the business, want the business, and do little to improve the quality of our creative processes.

This picture is repeated all over the world in major commercial centers including America, where our shelves are stocked with imported merchandise --- no longer the tinny "Made in Japan" goods of years past, but quality, well-made, well-designed products - products made with pride and with craftmanship.

What are the reasons for this seeming malaise?
It is far beyond me to evaluate the economic factors involved, but it is obvious that, from a competitive point of view, we are not competing and someone else is doing the business; someone else is making the profits; someone else keeps their people employed.
The economic factors are certainly important, especially in our affluent society where our high standards of living are admirable, but they are in jeopardy.

Is it a question of not knowing how? Hardly! We've gone to the moon. We can find a way. Is it a question of culture in America? Where, as an immigrant society of craftsmen of a hundred years ago, we took pride in what we made, but now, our interests have changed.

The worker, who is also the consumer, is not motivated. He is overwhelmed by technology. Is it a matter of the manufacturer not being interested? Example: you want 200 rooms of furniture? Push a button - it's done in one day. You want 5,000 yards of carpet? Push a button - it's done in one day. This applies to most products, I'm sure. Products are no longer made by people in America.

We are still a young society with very diffused cultural roots. We are a system of government that works but has yet to develop a sense of cultural identity and refinement of its own. How do we accelerate the process?

Is it a question of education? The system is over-specialized. Among the professions, the subject of the creative process is isolated and relegated to a small group who are forced to thrive in a relatively esoteric and alienated environment.

Our affluent society, which does not always include the worker, is developing its taste level at a rapidly increasing rate. In my field, Hotel Design, the Roadside Inn is an object of History, and in short time, we have

passed through the Holiday Inn phase to large, elegant, high-rise productions to now, where developers are building many small so-called "European-style" hotels with more services and luxury. Because this is what the public wants.

The word "design" is very broad. It touches our lives in so many ways; it makes us feel good and helps us live better lives. I believe that through a proper study of the uses of good design, our society will improve and business will follow. We have the tools, the educational base; we have the designers who are motivated; we have the facilities and the financial wherewithall; but we need a vehicle to tie it all together and stimulate its activity.

America's great strength is individual expression. This strength is unique in all History. It is interesting that the great artistic and creative epochs took place under the patronage and support of relatively dictatorial governments. I do not propose a regulatory agency that would dictate policies, but a guiding force that will research the problems and provide guidance and stimulation towards solutions;

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encourage higher standards in the creative process, and further improve the quality of life in a great country.

I believe that if properly developed, a United States Design Office as presented in House Bill #3839 is an important and essential step for America to assert itself in the worldwide market place.

Mr. DYMALLY. Mr. Chairman?

Mr. WALGREN. You have covered a tremendous range in a most provocative fashion, and I do not know what I can add. I have just been absorbing it, and the things you say make a great deal of sense.

It seems like the task is so big; how do you get a little manageable piece out of that? I do not know, but the public discussion of it certainly has to be the first step, so perhaps something will be helpful from that.

Does anybody see import restrictions as being helpful or constructive in the dilemma that we face or the adverse effect of international trade that we are now facing? Professor?

Dr. ROSENSTEIN. I believe this is all part of having a long-range national policy. Selective use of import restrictions can be used as a bargaining tool; it can be used as a means to protect an emerging industry.

I pointed out earlier that in order to develop the Japanese semiconductor manufacturing industry, they deliberately placed import tariffs upon the foreign-made chips. I think it is high time that the United States began to use the power of its marketplace as a means of negotiating reciprocal considerations with people such as Japan.

I was amused that our Special Trade Ambassador went over there to negotiate orange juice. We wanted Japan to import navel oranges from the United States and completely ignored what was happening to our semiconductor industry.

Mr. WALGREN. I cannot help but add, from my district there is a very close friend of mine who is very sensitive to imports since he works for United States Steel. He told me his approach to fair trade, and the idea was it had to be 50-50. He said, "You do $50 worth of business with us; we will do $50 worth of business with you."

Dr. ROSENSTEIN. Exactly.

Mr. WALGREN. That may or may not be too restrictive, but that is certainly a little bit better than 0-100, I would imagine.

The whole concept of design implies control in it, and, Professor, you lamented the fact that we are lacking in the cooperative approach between government, industry, and management. The only time that I have seen that triumvirate raise its head structurally was in what was called the Tripartite Commission in the steel industry, which was an attempt to have industry, labor, and government, actually measure their resources and find a cooperative goal with respect to clean air, in particular.

The result was the extension of what is called the steel stretchout where they modify the environmental law to accomplish agreed-on goals in a manageable time frame, a time frame that was manageable from industry's capital assessments and taking into account labor's consideration of health in the workplace.

That, of course, was absolutely unhorsed by the new administration. They abandoned the Tripartite Commission on the grounds that all this would happen, anyway. Are we really going in the wrong direction, and do we really have to fear the concept of control of Government if we establish these kinds of cooperative councils?

Dr. ROSENSTEIN. This is a straw man. Historically, it has not been true. If a truly cooperative arrangement is set up where labor, industry, education, and the Government work as partners, it becomes a more democratic process. It does not become something that is controlled by the bureaucracy.

Agriculture is an example. This country would not be the major force in the agricultural world market if we did not have an agricultural extension system and an agricultural act that goes back over 100 years. When we at UCLA started comparing cooperative versus adversarial industries in the fifties and sixties, the contrast was startling. Practically without exception, those industries which, either through law or by accident, had achieved some reasonable cooperative level, prospered. Those which adopted the adversarial approach became so inefficient, they simply could not exist.

Let me a give a few examples. It was the accident of the demands of defense that caused the Government to become highly involved in cooperative efforts with the universities and with industry for the development of computers. As a consequence of that, the computer industry became a mainstay of the American economy.

By contrast, in the consumer electronics field, there has been no cooperation to speak of, and we have lost most of consumer electronics.

The same thing holds true in aircraft. The United States predominant position in aircraft is a direct result of cooperative efforts between the Government, industry, and education to develop the basic technology, the basic knowledge, the productive capability. As a consequence of that, the United States still dominates most aircraft markets, although we observe that in Europe they have cooperative programs for both the Airbus and helicopters, and our superiority is being challenged in a time where our cooperative efforts are weakening.

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Mr. WALGREN. It seems worth underscoring. You had mentioned in your testimony that the major investment in computers from a governmental standpoint was made by the Defense Department, and in particular that investment.

Dr. ROSENSTEIN. Yes, VLSI.

Mr. WALGREN. The $1.2 billion or something like that in an effort to get to the larger circuits.

Dr. ROSENSTEIN. Yes.

Mr. WALGREN. And it is also my understanding that in the computer area, almost all our university structures were built up by DARPA, the Defense Advanced Research Projects Agency, which was governmental dollars building a directed capacity or an institutional capacity. This was determined by a very small group of people in the Defense Department that somehow had the public support simply because it was labeled Defense. The same thing holds true with the national defense education scholarships. Somehow, under the rubric of defense, comes a Government initiative that produces a desirable result, and yet we cannot seem to get Government initiatives unless they come under the umbrella of defense.

I just lament that fact and want to underscore it because it seems so short sighted of us. We seem to cut off our nose to spite our face so effectively when we live within that limitation.

I would only encourage everybody in the room to watch television Saturday night. One of the networks will be putting on interviews with General Westmoreland about the defense intelligence assessments in Vietnam. It is stated baldly that the Defense Department misled the President and the public about what they knew to happen, because they were in pursuit of a given political objective. It just makes me want to raise the question of whether we want to only operate under this umbrella of defense simply because we get the instinctive support of the public when something comes down from that pillar that we instinctively must support.

Also, in the background materials for this hearing, there was an editorial of several years ago when a Federal Design Office was under discussion. It was titled "A Federal Design Office: Towards Esthetic Czarism."

I would like to contrast your use of the word "democracy" in the reality of what comes from cooperative efforts with the fear of control that we have in this country. Somehow, people think when you get beyond the individual level, you no longer have freedom but rather "czarism", when the truth of it is you may have a more effective democratic progress.

Well, I am sorry to have gone on like that.

Dr. ROSENSTEIN. This is the crucial question that faces us today. How do we get beyond these fears of bureaucracy to obtain a democratic means of establishing long-term national policies? Examples of how this can be done are all around us. Consider our agricultural system and note how it works in a State like California, or a country like California, if you would. When we have a problem like the Medfly the University of California and the Agricultural Extension people go to work on the problem as soon as it is reported. They devise programs and means of combating it. They do this in cooperation with the educational institutions, with the Govern-

ment, with the industry itself, and very quickly, these problems are resolved on a completely democratic basis and without Government interference. The Government provides the incentive and the long-term support. The direction comes out of the society itself.

This is also true for Japan's MITI, which is a quasi-government agency. Industry and education have a very strong voice in the development of Japanese policy, Japan's MITI and the U.S. agricultural system are model of cooperative action in the Nation's interest without government domination.

I wanted to observe from what has already been said this morning, just how integrative policies can be derived. In Japan, we saw that there was a national industrial and trade policy. To support that policy, they developed both a national design policy and they developed a national financial policy. The national financial policy in turn required a national savings policy. All of these were integrated into a mutually supporting policy structure.

The national design policy, and we heard this from Mr. Wynne, required a supporting educational policy to develop the educated minds who could respond to the need for advanced industrial design capability.

At the same time, they recognized that decisionmaking and design cannot be done in a vacuum. An extensive integrated information base is required. Thus Japan, to further industrial design—as well as other areas—has developed an industrial information base policy wherein they continuously collect information, organize it, evaluate it, and make it readily available to both the practitioners and educators in their field.

So we see that there is a whole hierarchy of policy which has been developed as a collective national effort with results that are being felt throughout much of the free world today. Most of the oriental nations have already begun to adopt one version or the other of Japan's policy strategy. It can be observed in Korea, Taiwan, and Singapore.

If we look back for the origins of these cooperative national policies, we find ourselves going back to the U. S. agricultural system. There is a one-to-one correspondence between what is being done in Japan on a rather large national scale and what the United States so successfully implemented through its agricultural system.

Mr. WALGREN. If I might just ask, Professor. You indicated the Japanese rate of savings. I have heard it said, though, as the other side of that question, that in our savings, we do not count what individually we put aside for social security. If you were to also take into account the social security system in this country our savings would approach that of other societies, perhaps, if not the Japanese.

Does that mean that we are making the same effort but not getting the same industrial bang for the buck because our social institutions are different than in other countries? These institutional arrangements place money in a way that makes it unavailable for use in terms of savings, as compared to other countries?

Dr. ROSENSTEIN. Again, I think it comes back to a lack of overall policy, long-term policy planning and developing an integrative policy structure. I do not have the statistics on social security, but the one thing I am sure of is the savings that go into social security

are not being used to finance industrial expansion. In Japan public savings is the major engine to provide the money to finance their industrial expansion.

Mr. WALGREN. I have used up my time, and I apologize for using too much, but what Mr. Hirsch indicated about the commercial hotels being the high rises and requiring the affluent, as opposed to the European design which may be more in demand by the public, reminded me of an experience I had last night. When I came to Los Angeles, I went to the wrong Hilton apparently, and at 2 in the morning there was a young woman checking in. She paid her bill in advance for the room. I am sure it was the least expensive room in the place but still she took out of her wallet $80.63.

I could not help but have the reaction that, well, she may be checking in now, but neither she nor anyone else will be checking into those hotels for very long at that kind of a price. I must confess, I cannot imagine where we are headed if the design of that industry has led us to have to carry that kind of an overhead on an individual charge for one night's stay. America is not going to be traveling very long. Any reaction?

Mr. HIRSCH. That is just the beginning, because the cost of construction, the cost of supplying a hotel, the cost of doing everything in a hotel, and the land, have all escalated. Eighty dollars today; probably the Los Angeles Hilton will be $100 within 1 year to 2 years, and it has just been going like that.

Have you stayed in New York lately, or Washington, Washington especially?

Mr. WALGREN. Well, I cannot help but be reminded of the commercial where they check in but they do not check out. We may be checking in now, but we will not be checking in very long.

Well, thank you very much, Mr. Dymally. I appreciate it.

Mr. DYMALLY. Thank you, Mr. Chairman.

Dr. Rosenstein, you talked about a foundation for the professions. Could you define "professions" for us? What do you mean by professions?

Dr. ROSENSTEIN. I have to be careful because the word "profession" is very much like the word "design." It has a different meaning for everyone.

We have been talking about what we call the public professions. These are areas of endeavor which require specialized knowledge and extensive educational preparation, which have a significant relationship with public affairs and the allocation of societal resources, which are accountable to constituencies and the public and include accounting, architecture, dentistry, education, engineering, journalism, law, management, medicine, nursing, pharmacy, public administration and legislation, public health, social welfare and urban planning.

There is a recognized responsibility for the allocation of defined societal resources and a responsibility for a certain segment of the society's environments. For example, the medical profession has the responsibility, recognized by society, for the allocation of our medical and health resources in order to improve the health environment.

There is often confusion between professions and technicians. The difference is that of responsibility. A doctor, a lawyer, an engi-

neer can be sued and held accountable by the society for his professional acts.

The important characteristics are resource allocation and responsibility for the environments. Collectively, of course, the professions are responsible for the national quality of life. There is a great deal of confusion in our society for our newspapers do not understand the difference between science and the professions. They keep talking about science as an all-encompassing factor, where, in reality, science is the pursuit of knowledge generally for knowledge's sake.

The professions, on the other hand, do bear responsibility, the direct responsibility. for what we call the quality of life.

Mr. DYMALLY. We have been led to believe through publications that the reason why the Japanese do so well in production is because of their culture, their way of life, and their loyalty. You have suggested here in your testimony that that may be a myth; it is really their fiscal policy.

Dr. ROSENSTEIN. I think that is true.

I certainly admire the Japanese as a people, but they are no more industrious than many other sets of people, and what we see as national Japanese qualities, many of which have been developed in the last years, are not really based upon these individual personal traits. Their success has been based upon their ability to take the finest management and organizational concepts from all over the world and apply them in an organized fashion to their national problems. They are probably the best-managed society in the world today.

Mr. HIRSCH. I would like to add to that if I may.

Mr. DYMALLY. Of course. My questions are for any or all of you.

Mr. HIRSCH. Two points I would like to mention. One of them is, if we can go back to Mr. Walgren on the subject of hotels, that same room today in Japan would cost double of what that lady paid last night. They also have the highest cost of living in the world. You know, you can buy an apple for $4 or $5 over there.

But it also indicates that people are making money, that this whole cultural-fiscal relationship has been working very well for them. I still maintain that a lot of their design product, however, is a result of years of refinement and sensitivity in esthetics, and I think there is a direct relationship to the end product that comes out of the country.

They can take our technology and produce a Toyota automobile that operates like a Sony radio or something like that, but refine it down to its essences. I think that is a place for learning lessons also, not only in their fiscal policies.

Mr. DYMALLY. Any or all for this question.

Secretary Baldrige has suggested that we might want to pursue this effort embodied in the bill as a private sector effort on a voluntary basis, but I heard testimony here that you need, really, the force of Government, as is the case with the other countries and in Finland since 1911. Would you comment about that, any or all?

Mr. WYNNE. Well, based on past experience with our organization, for example, in which we have directly brought up many of the points raised in this bill to businessmen, you run into two problems: One, businessmen are under very great constrictions at the

present time to maintain high profit margins from boards of directors and shareholders.

Second, the importance of design has not been an integral part of business education. Most businessmen do not understand the design process. There are some very notable exceptions, and you will find many of these in the larger businesses. IBM, for example, has had one of the best reputations in the world for product design. One of the reasons provides a somewhat interesting story. Thomas Watson, Jr., in World War II, found his bunker mate was an industrial designer. As a result of that, when Thomas Watson, Jr., took over the helm of IBM, he brought this industrial designer with him. IBM has a marvelous reputation for quality design.

Government is an important partner. Now, whether the mechanism is an agency within the Department of Commerce or a separate foundation or a quasi-governmental body, Government has got to be a partner. It is their leadership which is required to bring the varying elements together in a long-term policy.

A question that arose earlier was, what is the long-term policy of the Department of Commerce? One has the feeling that there is a conglomeration of programs which have been created over the years, and the function of the Department of Commerce is to administer those programs.

Somehow, that does not seem a justification for a body whose primary function should be the long-term economic growth and welfare of the United States. Yet one does not hear those kinds of terms coming from the Department of Commerce. What is their function? What is their vision; what is their goal, what are they trying to do on a long-term basis? I certainly have not heard them proclaim what their long-term goals are. This kind of leadership is an absolute necessity from Government, perhaps even more important than finance. Financial support is very, very important, but leadership and the setting of long-term goals (and sticking to those goals when short-term problems crop up) is just an absolutely vital part of this business-education-government partnership. It is a role which the Government could fulfill very, very successfully.

Mr. DYMALLY. Let me add another piece to that question. What about a compromising bill between the Government support and the private foundation in the bill, so that we could respond to the policies of the present administration with emphasis on the private sector with minimal governmental help?

Mr. WYNNE. If the long-term goal is our economic growth, product innovation, greater sales of American products, and a more stable economy, and if a design council is seen as a mechanism for achieving that growth, then the construction of that mechanism is less important than its ability to achieve the long-term goal.

So, certainly, if there is some mechanism which can engage the business community, the design community, government, and education, that mechanism would be appropriate.

Mr. DYMALLY. Professor?

Dr. ROSENSTEIN. There is a very subtle point here, and I certainly agree with everything that Mr. Wynne has said. There is the need for long-term objectives and long-term planning. There is a need for leadership. There is a need for assurance of some minimal level

of financial support so you do not have to go from year to year wondering if you are going to exist.

Let me try to contrast our lack of policy in trade, in design, in the professions, with two other areas. We have a science policy, and it is exemplified by the Science Foundation, and I do not think anyone would say that the science community is controlled by government. There is some fiscal control, but certainly science in this country has blossomed with the advent of the National Science Foundation in 1950.

It is hard to believe that the Science Foundation is only 30 years old. In that short span of time, as a result of leadership and heavy involvement of the science community in the policies and planning of the science future of this country, the United States is the science leader in the world. By any measure that you can think of including a number of Nobel prizes, literature published, et cetera., there is no question of preeminence of U.S. science.

We now have a Foundation on the Arts and Humanities, and we are beginning to make substantial progress there.

Along with the pursuit of knowledge of science and our cultural heritage, the arts and humanities, the third essential element of any society is the quality of life, which is the responsibility of the professions. Here the United States is in trouble for there is no policy and there is no leadership. Something that most people do not realize, and yet it is a major factor in the decline of this country, is the fact that the professional schools in this country, by and large, no longer exist as professional schools.

The influence of the science policy has been so great that the professional schools, to exist, have had to give up many of the traditional professional pursuits in order to qualify for science grants. Our professional schools are basically schools of occasionally applied science. They are no longer the design-oriented, professionally oriented, societally directed schools that existed before.

In the science community, graduate work and research is the reason for being. As a result, we find that the professional schools in this country have begun to retreat to the graduate area in order to gain respectability. This is probably the only country in the world, with the possible exception of Canada, where professional degrees in medicine, law, social welfare, architecture, almost any school you can name, are given as graduate degrees. Everywhere else in the world, you begin your medical, law, et cetera, education as an undergraduate and receive an undergraduate degree.

You might say, "Well, so what?" The "so what" is that a graduate degree is a research degree and it is enormously expensive. It is so expensive in the area of medicine alone that the U.S. quality of health has gone down even though we do most of the medical research in the world. It is so expensive that the United States imports 50 percent of its doctors. We cannot afford to turn out enough doctors, and yet the 50 percent who are imported, and will perform perfectly well in our system, receive undergraduate degrees.

The largest U.S. medical school in the world is in Guadalajara, Mexico. They turn out more American citizens as doctors than any U.S. college.

In a very short time, 50 percent of our doctors are going to be educated abroad, which means that we have made medical educa-

tion so expensive that we cannot afford to educate our own children as physicians. Maybe this is a way of leveling things, because now children of foreign origin can come and enjoy the benefits that we are withholding from our own children.

The presence of a Science Foundation without a counterbalancing professions foundation has had devastating effects across the campus. The professional schools now think upon themselves as research schools. They do not think of themselves as primarily professional schools. My favorite example that shows how pervasive the existence of a science policy without counterbalancing professions policy can be, happened at UCLA.

There was a country fiddler by the name of Joscha Heifetz who was teaching at UCLA. I think some of you have probably heard of him. He is well known. He was teaching as an adjunct professor, and we even had built an auditorium for him because I understand he has a fairly good ear for sound. One day, for some reason or other, Heifetz decided he would like to be a regular tenured professor. I cannot imagine what extra privileges he would get for we all pay for our parking.

He went to the chancellor and explained what he wanted, and he said "By the way, I will turn back any salary," Heifetz gets approximately twice as much for one concert as the average professor receives for an annual salary.

Thus we had an opportunity to hire Joscha Heifetz free. A committee was appointed. They reviewed his credentials. The UCLA Music Department then rejected Joscha Heifetz because he had not published. [Laughter.]

Now that is a fact. The sequel to the story is that Joscha Heifetz came over here to teach at USC. This made our faculty feel very good for it vindicated their judgment. Everyone knows that USC is a poor cousin of UCLA. All that USC could say for itself is that they now had a man by the name of Heifetz on their music faculty and another one by the name of Piatagorsky.

My son took music at UCLA and switched to computer engineering after a while because, he said, "The faculty are wonderful critics, they are fine people, but they are musical eunuchs. They can talk about it, but they can't do it."

Mr. DYMALLY. Professor, I have been chuckling while you were talking. I was in Jamaica just before Christmas, and in a discussion with the vice chancellor about medical education, I said to him, "You only give"—of course, I am brainwashed, you understand that—"You only give a bachelor's to your doctors, doctors of medicine." He said, "Yes. To get a doctor's degree, you have to come back and do graduate work."

Dr. ROSENSTEIN. This is what is missing. We have developed an enormously expensive research institution which basically is not oriented to the professional needs of society. You can go from professional school to professional school and find the same situation. UCLA just put in a doctor's degree in architecture, and it is a fine program. It is devoted to scholarly endeavors and research. They did not put in a professional doctor of architecture degree.

Mr. DYMALLY. We also call our lawyers doctors now. I want you to know that.

Mr. Chairman?

Mr. WALGREN. Nothing further, thank you.

Mr. DYMALLY. You are not a lawyer, I hope.

Mr. WALGREN. Well, I am a lawyer, but I am one of those that did not send back to get the certificate changed.

Mr. DYMALLY. It costs only $25. I am quite sure you could afford that, Mr. Chairman.

Any questions from staff? [No response.]

Well, thank you very much for coming, all of you, and I trust you will be in touch with the staff to give your refinements to the final piece of legislation.

Mr. WYNNE. Yes, I will.

Mr. DYMALLY. Thank you very much.

[Whereupon, at 11:50 a.m. the subcommittee adjourned.]

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